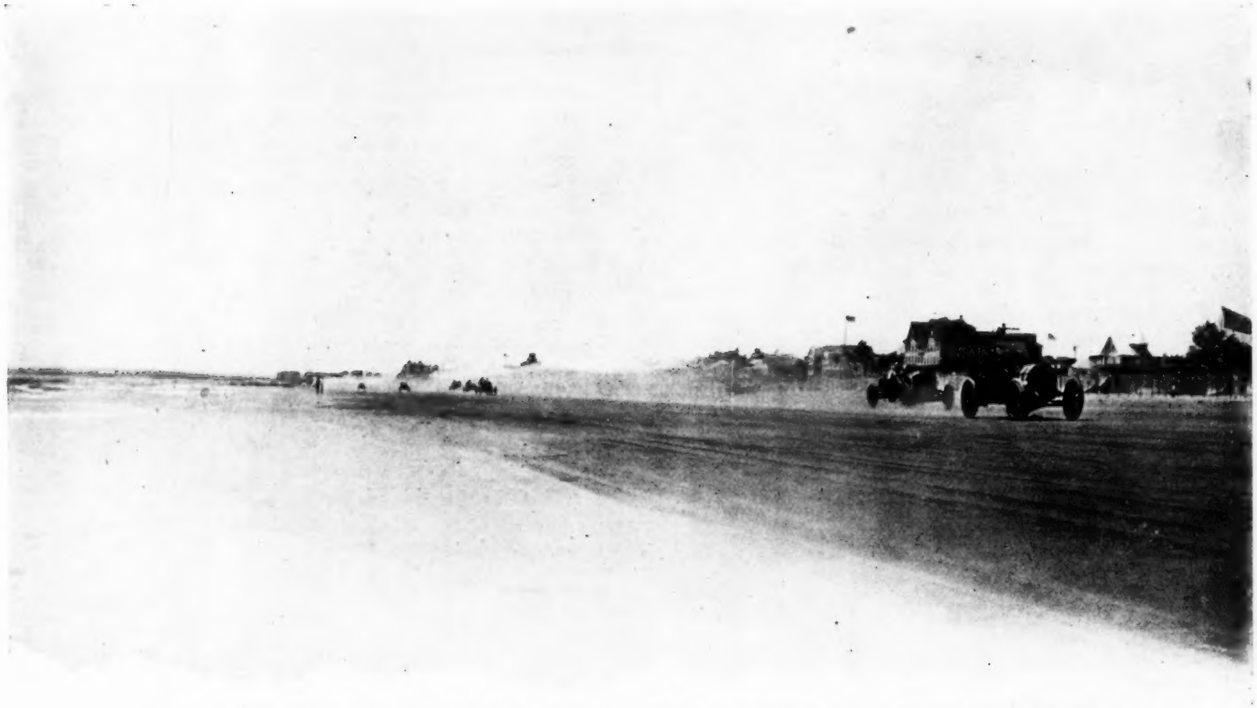
VOL. XXVII NEW YORK—THURSDAY, JULY 11, 1912—CHICAGO No. 2

THE AUTOMOBILE

Records Go at Old Orchard Beach

Disbrow, in Case, Lowers Mile Figures to 35.1 Seconds, Clipping 3.9 Seconds from Former Mark—Simplex Covers 5 Miles in 4:04.50 and 10 Miles in 8:53—Lewis, Stutz, Captures 100-Mile Event in 1:32:43.60



General view of the old Orchard Beach course, looking south, during the 100-mile race on the second day

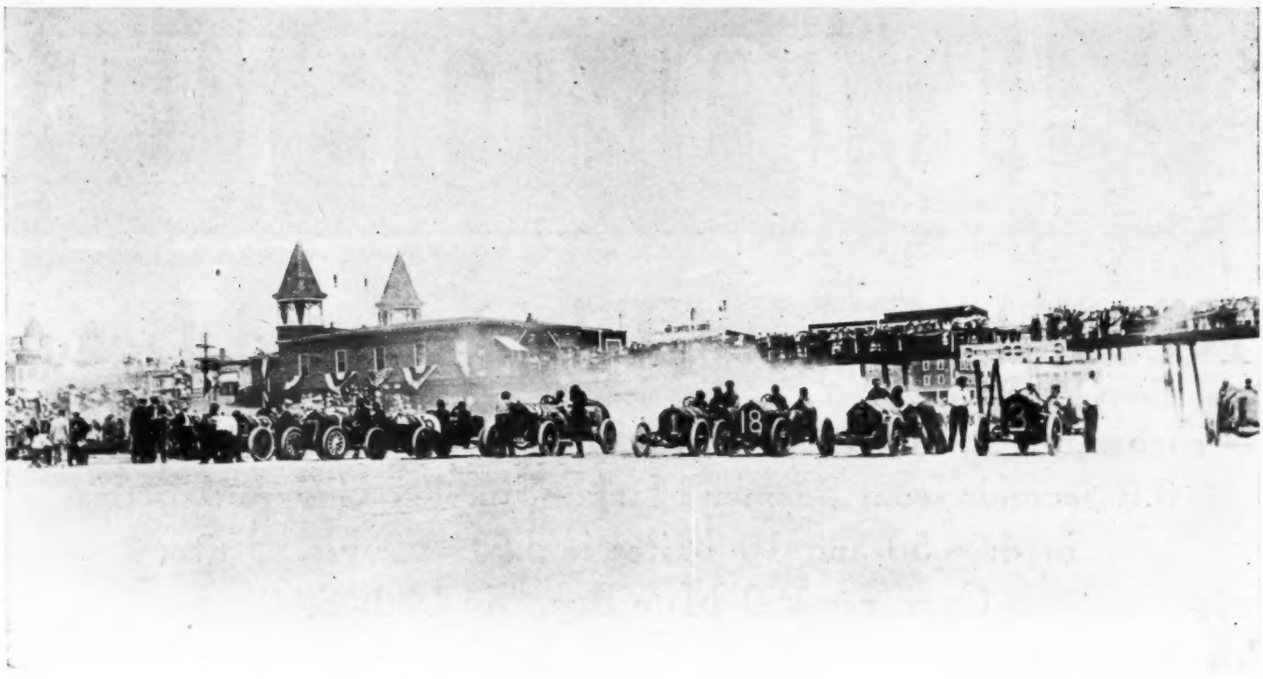
OLD ORCHARD BEACH, ME., July 6—Once more Old Orchard has had an automobile meet, and once more the famous beach has made good as a race course. On July 4, 5 and 6 some of the best drivers of the country appeared here and many new marks were set up for the course.

Louis Disbrow in his famous Jay-Eye-See, Harry Grant, Joe Nikrent, Jack Rutherford, Jack Le Cain, Joe Matson and other noted drivers were all on hand to do their little stunt to show the Maine devotees of automobiling just what real racing is. And everyone of them made good, to a greater or lesser degree.

While at the races last September there were some marks set up for the Old Orchard Beach course that were questioned, most of those were beaten at the meet just concluded today. Louis Disbrow set out to establish a beach record in his Jay-Eye-See. He did it. On Thursday, July 4, he took a long flying start and covered the mile in 35.1 seconds. Last year L. F. Baldwin in his big Stanley steamer did the distance in 39 second's flat.

Today, the last of the meet, Disbrow in the Simplex Zip covered 5 miles in exhibition in 4:04.50 and did the 10 miles in 8:53. These are not as good as the marks given for last fall's races, but as the course in 1911 was questioned, it is thought the new figures set by Disbrow will be taken as the standard for the beach.

On Friday "Bill" Endicott in his Schacht did the 100 miles in 1:36:41, which bettered the time of 1:39:50 made the year before. But even this mark did not stand long, for today Dave Lewis in a Stutz covered the distance in 1:32:43.60.



Line-up of contesting cars for the 100-mile race on July 4, won by Stutz, No. 4

Perhaps the most thrilling event of the 3 days was the 100-mile race on Friday. Jack Rutherford, winner of the century the year before, was out to repeat the performance. On Thursday he burned out a clutch, but his machine was in fine fettle for this event on Friday, or at least seemed to be.

For 99 miles he held the lead as the cars raced around the course and as some were left by the wayside. As he entered his one-hundredth mile the oil supply failed and Bill Endicott, who had been running second, passed the National and won out. It developed that the oil tank had begun to work loose in the fortieth mile. Rutherford kept on, however, occasionally easing up his machine. The continual jar had its effect and at last the oil gave out altogether. He burned out a bearing at the finish, but still was able to cross the line 9 seconds behind Endicott.

On the glorious Fourth there were fully 50,000 people at the beach to see the sport. The next 2 days, however, for all they developed better sport, proved to be disappointing from the attendance point of view.

The officials were: Referee, Daniel W. Hoegg, Jr.; Starter, John C. Herrison; Assistant Starter, W. A. Creighton; Judges, Wesley G. Smith, William Whittier, W. J. Milliken; Representative of the A. A. A., Daniel W. Hoegg, Jr.; Timer, George E. Barbour, Jr.; Assistant Timers, J. C. Estes, W. F. Coffey, W. H. Swett, George H. Sears; Scorer, L. M. Hart.

The following is a summary of the 3 days:

FIRST DAY

One-mile time trials, flying start

No.	Car	Driver	Time
	Jay-Eye-See	Louis Disbrow	35:10
3	National	John Rutherford	47:00
7	National	Neil Whalen	47:50
21	Chadwick	L. C. Hersey	55:10
1	Berkshire	Harry Grant	58:00

Class C, non-stock; 161 to 230 cubic inches; 5 miles

14	E-M-F	Billy Burke	No time taken

Class C, non-stock; 231 to 300 cubic inches; 10 miles

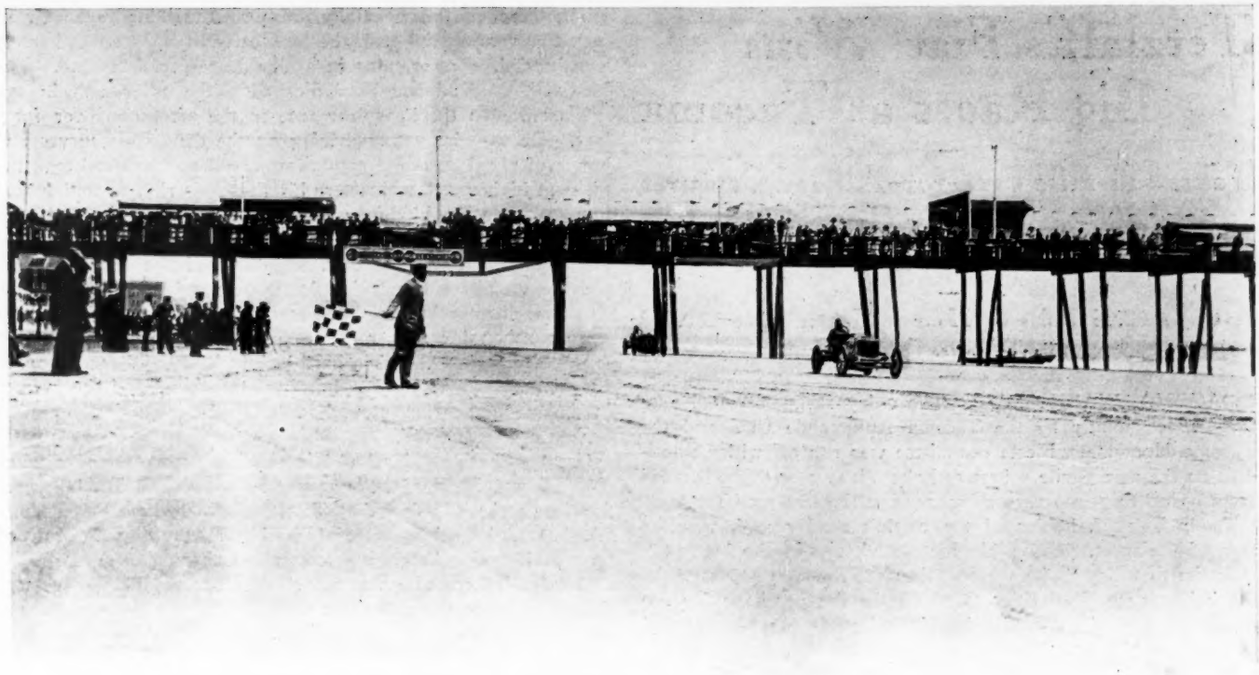
5	Case	Joe Nikrent	10:28.75
11	Mercer	John De Palma	10:30.75
9	Lexington	James Esleeck	No time taken
10	Case	Louis Disbrow	Did not finish

Class C, non-stock; 301 to 450 cubic inches; 5 miles

3	National	John Rutherford	4:25.80
4	Stutz	Dave Lewis	4:42.10
6	Schacht	Bill Endicott	4:45.00
7	National	Neil Whalen	4;46.50
1	Berkshire	Harry Grant	No time taken

Start of 231-300 cubic inch race on July 4

Hummel's Mercer skidding at outer mark in 50-mile race



Case Bullet leading Hummel's Mercer in the 50-mile race on July 5. The Mercer won the race

Class E, non-stock, under 600 cubic inches; 10 miles

2	Simplex Zip	Louis Disbrow	8:36.75
12	Fiat	Joe Matson	8:50.10
4	Stutz	Dave Lewis	9:00.00
18	Bianchi	Charles Basle	10:10.14
7	National	Neil Whalen	Withdrawn
3	National	John Rutherford	Withdrawn

Class E, non-stock, special event (three races running simultaneously); 100 miles. Race A, 301 to 450 cubic inches; Race B, 451 to 600 cubic inches; Race C, over 600 cubic inches. Race stopped at end of 75th mile

4	Stutz	Jack LeCain (75 miles)	1:17.48.75
1	Berkshire	Harry Grant (75 miles)	1:21.06.00
7	National	Neil Whalen (65 miles)	1:21.12.00
3	National	John Rutherford	Did not finish
6	Schacht	Bill Endicott	Did not finish
12	Fiat	Joe Matson	Did not finish
16	Fiat	Robert Stuart	Did not finish
18	Bianchi	Charles Basle	Did not finish
21	Chadwick	L. C. Hersey	Did not finish

SECOND DAY

Class E, handicap, non-stock, under 301 cubic inches; 10 miles

14	E-M-F.	Billy Burke (22 sec.)	5:49.50
11	Mercer	John De Palma (scratch)	5:57.10
17	S. P. O	Howard Plimpton (36 sec.)	6:16.50

Class D, non-stock, free-for-all; 5 miles

2	Simplex Zip	Louis Disbrow	4:39.10
4	Stutz	Dave Lewis	4:40.00
12	Fiat	Joe Matson	4:42.00
7	National	Neil Whalen	4:50.00
21	Chadwick	L. C. Hersey	No time taken
3	National	John Rutherford	Withdrawn

Class E, non-stock, under 301 cubic inches; 50 miles

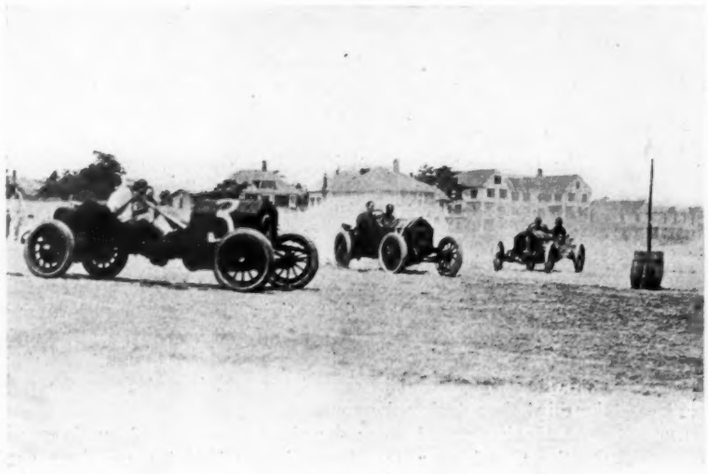
11	Mercer	Alfred Hummel	54:10.50
5	Case	Joe Nikrent	55:45.00
17	S. P. O.	Howard Plimpton	1:07.10.75
10	Case	Louis Disbrow	Did not finish

Class C, non-stock, 301 to 450 cubic inches; 5 miles

3	National	John Rutherford	4:32.30
4	Stutz	Dave Lewis	4:43.10
7	National	Neil Whalen	4:47.10
6	Schacht	Bill Endicott	5:02.50
1	Berkshire	Harry Grant	Did not finish

Class E, non-stock, 301 and over cubic inches; 100 miles

6	Schacht	Bill Endicott	1:36.41.00
3	National	John Rutherford	1:36.50.10
7	National	Neil Whalen	1:40.05.10
1	Berkshire	Harry Grant	Did not finish
12	Fiat	Joe Matson	Did not finish
21	Chadwick	L. C. Hersey	Did not finish
4	Stutz	Jack LeCain	Withdrawn
15	Jackson	Harry Cobe	Did not finish



Three cars strike turn at once—National, Fiat and Berkshire

Endicott's Schacht going at 70-mile clip in the hundred

Tetzlaff's Fiat Wins Big Races at Tacoma

Takes 250-mile Free-for-All and Captures 200-mile Heavy Car Race Previous Day

Averages 68.66 Miles an Hour in Latter Race—70,000 Spectators Witness the Five Events

TACOMA, WASH., July 7—The 2-day racing carnival promoted jointly by the Tacoma Automobile Club and the Tacoma Montamara Fiesta committee was run off without accident on the new 5-mile course at Lake View, near this city, with from 60,000 to 70,000 persons witnessing the five road races.

Teddy Tetzlaff, holder of the world's road record, was the star of the meet, driving his Fiat to victory in the heavy-car race the first day and annexing the free-for-all yesterday. In the Friday race Tetzlaff averaged 68.66 miles per hour for 200 miles, while in the 250-mile free-for-all yesterday he averaged 65.8 miles per hour. The medium-heavy car race Friday at 150 miles went to Cooper in a Stutz with an average of 66.6 miles per hour; Pollem in a Mercer took the 150-mile medium-car race at 61.9 miles per hour, while the light-car race at 100 miles was taken by Evans in a Flanders special at 61.1 miles per hour.

Tetzlaff won first place and $3,500 in addition to the Montmarathon perpetual challenge trophy. Bergdoll won second place and $1,000. Devore won third place and $500.

Friday morning's races, although sensational, did not equal the afternoon contests. A series of mechanical troubles resulted in all the cars in the medium-light car class being withdrawn with the exception of the Mercer driven by Pollem. In the light-car class, which was run in connection with the medium-weight car event, there was an especially pretty and thrilling race. Evans in a Flanders special took the lead early in the race and never was headed. Tower, also in a Flanders special, second. The Maxwell, Oakland and Ford finished in the order named.

Tetzlaff won the heavy-car race in the afternoon over forty laps. He won by steady driving on the dangerous curves and bursts of speed on the straightaway stretches. Mulford took the turns at high speed, which tore his tires into ribbons and forced him to go to the pits four times. Finally he came in with a bleeding head caused by a flying stone and relinquished the wheel to his mechanician, Chandler, who finished the race. Tetzlaff went to the pits but once for tire trouble and once for gasoline. The Fiat pit men had excellent team work, while the Knox men were considerably slower.

Hughie Hughes played in hard luck in both days' races, having considerable engine trouble, burning out a clutch on the Mercer in the medium-car event and in the free-for-all he suffered a broken connecting rod.

Great enthusiasm developed in the big event yesterday when Tetzlaff and Mulford held a duel of speed and Tetzlaff won. Mulford's car was fast, but Tetzlaff's tire luck was with him, which was helped by careful driving at the turns. Mulford took these with scarcely a perceptible slackening of speed. Earl Devore's National also was a victim of tire trouble and he was forced to go to the pits three times.

Two Races Run Simultaneously

The two races in the afternoon were run simultaneously. The Mercer, Stutz, National and Pope were in the heavy-car event and all except the Pope kept on after 150 miles were run off and continued in the heavy-car race.

The free-for-all started at 1:30 Saturday with six cars facing Starter Wagner. The Stutz with Earl Cooper at the wheel got away first and the Pope 30 seconds after. Then with ½-minute intervals followed Devore, National; Mulford, Knox; Tetzlaff, Fiat, and Hughes, Mercer. Cooper made the first 5 miles in 4:30. Tetzlaff made a wonderful start and finished the first 5 miles in 4:11.

With a phenomenal burst of speed the Knox took the lead in the sixth lap, when it passed the National in the back stretch, which was made in 4:00. Then followed another 5 miles but 2 seconds slower, and in the seventh Mulford made it in 3:55, a new record over a 5-mile course like that at Lake View.

The Flanders special No. 2, driven by Bob Evans, was first away from the wire in the light-car event and was first to finish, although Evans ran 150 miles instead of 100 and in the loss of the count on one lap he was put into third place by mistake. This was eventually straightened out and Evans given first place. Tower in a Flanders was second and Joermann, Maxwell, third.

Somewhat of surprise was the showing made by the little Ford owned and entered by W. C. Baldwin, of Tacoma. Frank Bennett driving made a good run, but twice tire trouble spoiled his chances.

After the heavy grind the course was subjected to in the first day's events a large crew worked all night and had it in excellent shape for the race on Saturday. The weather warmed up and brought out double the attendance of the first day.

The free-for-all resolved itself into a magnificent contest and a royal one between Tetzlaff in the Fiat, Bergdoll in the Benz and Devore in the National. After having reached a leading position in the nineteenth lap Tetzlaff never again dropped into second place, but all three cars were in the same lap for the last 50 miles and there always was a chance that positions would be altered. Hughes was first off in his wire-wheeled Mercer. The crowd gave him a great send-off and he responded by making the first lap in 4:09. He retained the lead until the third lap, when clutch trouble caused his withdrawal from the race, the third time during the contests.

As Hughes pulled up at the pits he was passed by Cooper in the Stutz, making a 4:19 lap. Cooper held his car there until the eighth, when Bergdoll in the blue Benz rushed by into first place. Cooper succumbed to Tetzlaff in the ninth and held third

OLD ORCHARD BEACH SUMMARIES (Continued)

Special event for mile record

Jay-Eye-See	Louis Disbrow	39:10

THIRD DAY

Class C, non-stock, 231 to 300 cubic inches; 10 miles

5	Case	Joe Nikrent	9:54.00
11	Mercer	John De Palma	9:59.90
9	Lexington	James Esleck	12:13.00
10	Case	Louis Disbrow	Did not finish

Five miles against time, flying start

2	Simplex Zip	Louis Disbrow	4:04.50

Class E, non-stock, 231 to 300 cubic inches (two races run simultaneously); 25 miles

Class 2-C, 161 to 230 cubic inches

14	E-M-F.	Billy Burke	27:10.80

Class 3-C, 231 to 300 cubic inches

5	Case	Joe Nikrent	25:29.10
11	Mercer	Alfred Hummel	25:37.10
9	Lexington	James Esleck	27:10.80

Class D, non-stock, free-for-all; 10 miles

2	Simplex Zip	Louis Disbrow (new rec.)	8:53.00
18	Bianchi	Charles Vasle	9:32.10
7	National	Neil Whalen	9:40.10
11	Mercer	John De Palma	10:22.00

One mile, flying start, for beach record

Jay-Eye-See	Louis Disbrow	.36.50.

Class E, non-stock (three races run simultaneously); 100 miles. Race A, 301 to 450 cubic inches; Race B, 451 to 600 cubic inches; Class C, over 600 cubic inches

4	Stutz	Dave Lewis, Race A	1:32.43.60
6	Schacht	Bill Endicott, Race A	1:36.09.00
15	Jackson	Harry Cobe, Race A	1:50.11.50
1	Berkshire	Harry Grant, Race A (90 miles)	1:54.30.00
7	National	Neil Whalen, Race A	Did not finish
16	Fiat	Joe Matson, Race C	Did not finish
18	Bianchi	Charles Basle, Race B	Did not finish

until engine trouble in the twelfth. A series of various delays placed the Stutz fourth and finally fifth in 20 seconds. From that time on the Stutz ran with consistent smoothness. Cooper had finished his forty-fifth lap when the National crossed the wire in third.

Ralph Mulford shared with Hughes and the Cole the bad luck of the day. The Knox driver received an ovation when he started out and when he made the second lap in 4:05 the crowd was frantic. He never passed the grandstand again, magneto trouble putting his car out.

Tetzlaff won his race on his merits. It is not fair to say he outgeneraled the field, but Bergdoll and Devore both drove magnificent races. Tetzlaff made his first lap in 4:26 and his was the fifth car to leave in the eighth. He caught the National in the stretch and jumped in fourth. After Hughes' retirement he ran third, making his best time, 3:59, in the eighth lap.

Bergdoll caught the Stutz on the back stretch in the eighth in view of the crowd, with Teddy's Fiat singing loud behind him. The next lap the Fiat swept past the Cole in front of the grandstand and at the end of the eighth was hard after the Benz, then running in first place and making a pretty race. For 50 miles these positions were retained, with the crowd growing wild as it was perceived Tetzlaff was cutting down the seconds.

In the nineteenth lap the excitement grew to fever heat. The Fiat swept past the Benz, which had traveled a slow lap in 5:49, due to tire trouble, and when Bergdoll spent 7:15 on his lap and tire change Tetzlaff lapped him. At this time Tetzlaff pulled in the pit for gasoline and, as fate would have it, had some trouble in getting the car started. Meanwhile the Benz was speeding along, cutting off the lost lap, with the result that the end of the twenty-second lap found the Fiat just 48 seconds in the lead. Tetzlaff never again fell behind.

When the Benz passed the Verbeck Fiat on the back stretch at 125 miles Tetzlaff's time for that distance was 109 minutes 4 seconds and he was leading by 4 seconds. In the twenty-eighth lap it was noticed the Benz was missing. Chain trouble had delayed him at the bridge for 12 minutes and when he finally passed the grandstand the crowd rose to its feet and gave him a mighty cheer. In the twenty-ninth Tetzlaff came into the pit for tires while the Benz made a 4:17 lap. The Benz after a stop for a broken chain made two good laps in 4:17 and 4:19, but dropped to fourth. In the thirtieth Verbeck was in the pit with engine trouble and Maggio was taken on as mechanician.

Battle Between Tetzlaff and Bergdoll

The thirty-first lap saw Devore second and the second Fiat third until its engine trouble when it went again to fourth. In the next two laps Verbeck made 4:18 and 4:05. The thirty-ninth saw a thrilling lap when Tetzlaff pulled up for gasoline. While the fuel was being taken on the red National rushed by with Devore grinning happily. The raw gas in the exhaust pipe of the Fiat caught on fire and before the car was ready to start the Benz rushed past, thus putting all three cars into the same lap.

Bergdoll was now driving his best and for five laps he and the National had it touch and go. In the forty-fourth Bergdoll made the lap in 4:05 and in the lap following was firmly in second place, which he retained until the finish. He made the best time he could, but Tetzlaff was well away, blazing his trail to the tune of 4:07, 4:06, 4:08 and 4:10, and as the crowd was advised of his progress it rose to its feet and gave the race hero a demonstration as Wagner held the checkered flag for him.

In the forty-fourth Verbeck entered the homestretch just behind the National, swung around it in a wide sweep, followed by the Benz. When he reached the front of the stand Verbeck endeavored to regain the course, but was carried over into the soft dirt near the pits. Just as the crowd held its breath to hear him crash into the pit bars he skillfully brought his car back into the road and was gone.

After this the spectators were frantic and after they had risen and applauded Tetzlaff, the Benz came in for its share. If Tetzlaff was a popular winner Bergdoll also was a great favorite.

All the drivers handled the curves very cautiously in the big event and this pronounced caution explains the very moderate rate of speed averaged even by the winner. Even the fact that it was anybody's race in the last 50 miles did not produce recklessness. This consistency of judgment is what made the Tacoma races remarkable for the lack of catastrophes.

"The Tacoma races were very fast in comparison with many of the records made on famous road courses of the country," said Starter Wagner at the conclusion of the races. "No records were broken, but good time was made throughout, and considering the green condition of the course, the showing was excellent. I will say without any exaggeration, Tacoma has one of the fastest road courses in the world."

The success of the meet is due in no small measure to the following officials: Fred. J. Wagner, starter; Robert E. Magner, who handled the Warner timing device; F. E. Edwards, chairman of the technical committee of the A. A. A.; and Walter Chanslor of Los Angeles, H. C. Mason of Seattle and Harry C. Miller of San Francisco, judges.

With 400 special guards patrolling the entire course outsiders were prevented from approaching within several hundred feet of the track. As a result there was not a single accident.

SUMMARIES OF MONTAMARA FIESTA RACES

FRIDAY, JULY 5

Light cars, purse $1,000, 100 miles

Pos.	Car	Driver	Time
1	Flanders Special	Evans	1:38:20.00
2	Flanders Special	Tower	1:39:04.35
3	Maxwell	Joermann	1:42:19.50

Medium cars, purse $1,500, 150 miles

1	Mercer	Pollem	2:25:13.00
2	Mercer	Bergdoll	

Failed to finish—Mercer, Hughes; Cole, Blizzard.
Sebastian injured in practice and could not take part in race.

Medium-heavy, purse $1,000, 150 miles

1	Stutz	Cooper	2:15:00.00
2	National	Devore	*
3	Pope	Rossi	*

*Not announced.

Heavy cars, purse $2,500, 200 miles

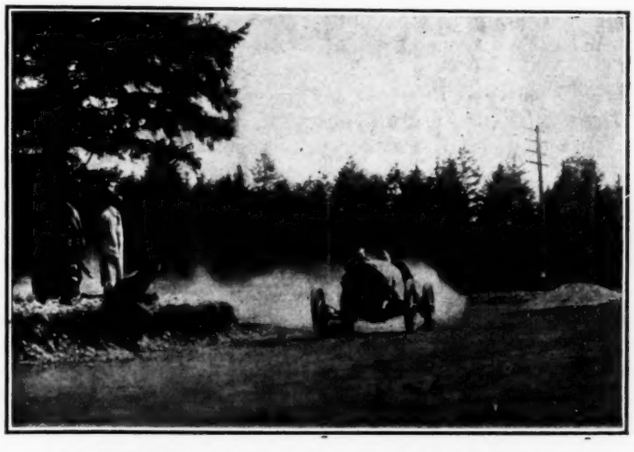
1	Fiat	Tetzlaff	2:54:31.65
2	Knox	Mulford-Chandler	2:58:10.15
3	National	Devore	3:05:42.00

Failed to finish—Stutz, Cooper; Mercer, Hughes.

SATURDAY, JULY 6

Free-for-all, 250 miles

No.	Car	Driver	Time
44	Fiat	Tetzlaff	3:47:00.45
43	Benz	Bergdoll	3:50:49.85
22	National	Devore	3:52:28.25
47	Fiat	Verbeck	3:52:56.15
20	Stutz	Cooper	Did not finish
45	Cole	Blizzard	Out 12th lap
40	Mercer	Hughes	Out 3d lap
31	Knox	Mulford	Out 2d lap



Tetzlaff taking one of the turns on the Tacoma course

American Wins Road Run

Driven by Ralph D. Earle, Captures Honors in Wildwood Test—Prizes of all Descriptions

Several Ladies Compete—Sixty-three Cars Start—Builders of Indianapolis Speedway Honored

WILDWOOD-BY-THE-SEA, N. J., July 3—Ralph D. Earle, of Philadelphia, driving an American car, captured first prize today in the roadability run from Camden to this resort held under the auspices of the combined Boards of Trade of Wildwood, North Wildwood and Wildwoo Crest. Earle's time for the 108 miles was 6 hours 22 minutes 40 seconds, which was within 35 seconds of the secret time set by Mayor J. Thompson Baker, of Wildwood—6 hours 23 minutes 15 seconds. The prize was $50 in gold.

Second prize, the Hotel Ridgway cup was won by F. P. Keeley, Case car, who finished 1 minute 13 seconds out of the way, his corrected time being 6 hours 22 minutes 2 seconds. M. R. Faulkner, Michigan car, captured third prize, the Colonial Hotel cup, Wildwood, in 6 hours 24 minutes 29 seconds, 1 minute 14 seconds slower than the secret schedule, and fourth prize, the Hutchinson Motor Company cup, Woodbury, was carried off by a woman driver, Mrs. C. V. R. Caldwell, in a Premier, time 6 hours 20 minutes 30 seconds.

In addition to the main prizes awarded to winners for the full distance there were supplementary running premiums for the drivers finishing nearest the schedule set for the intermediate controls, of which there were four. The Alloway Hotel cup, Alloway, N. J., offered as the first control trophy, was captured by N. A. Koch, driving an Interstate car, who checked in 51 seconds ahead of the scheduled time. Car No. 35, a Case, driven by Henry Fallows, won second prize, the Nelson House cup, Salem, N. J., he arriving at the latter town within 1 minute 18 seconds of the allotted time. Third control prize, the Bridgeton cup, also went to the Interstate car, but 2 seconds out of the way. The Ruric Hotel cup, fourth control prize, was won by W. Eldredge, driving a Garford.

Half a Dozen Ladies Take Part

In the special division for women only, of whom about half a dozen competed, two prizes were hung up, a sterling silver chatelaine bag for first and a sterling silver chatelaine wrist watch for second. The former was taken by the winner of the fourth prize in the main division, Mrs. C. V. R. Caldwell, time 24 minutes slower than schedule, the second prize by Miss Anna E. Verga, Kisselkar, 34 minutes 50 seconds slow. Mrs. Sarah Hoffman, Ford car, was third, 50 minutes 47 seconds slow.

In addition to the above prizes and trophies a special purse of $50 was set aside for the Philadelphia dealer having the greatest number of cars of any one make entered in the run. This was awarded to the Case with 10 cars in line.

Of a total list of 84 entries, 63 cars left the new Hotel Ridgway, Camden, this morning at irregular intervals between 9 and 11 o'clock. Of this number nearly a score were racing cars which figured in the roadability run as non-contestants for prizes, being entered in the Independence Day races on the Wildwood speedway. A baggage truck carried participants' luggage and a tire car followed in the wake of the train to provide first aid to the injured, the help of which was frequently sought.

Especial interest attached to the women's division of the run, supervised by Mrs. D. Walter Harper, and at every control the fair contestants were given an ovation. Mrs. C. V. R. Caldwell, driving a Premier car, monopolized the glory in this section, for she not only won first ladies' price but also captured fourth prize in the main division. The list of participants follows:

Car	Driver
American	Ralph D. Earle
American	William Thiellens
American	W. L. Jones
American	George M. Rubelli
E-M-F	Adolph E. Beldner
Stoddard-Dayton	Charles Veith
Franklin	George Karlavaghn
American Scout	Frank O'Keefe
Cartercar	H. Baker
Mercer	Harvey Ringler
Mercer	John R. Wood
Klinekar	C. C. Fairman
Klinekar	John Menker
Schacht	James M. Gray
Jackson	Charles E. Biddle
Stutz	S. R. Blocksom
American	James Stark
Fiat	William Freitag
Empire	R. S. Smith, Jr.
Regal	Sid Briscoe
Buick	Eddie Bauer
Paige-Detroit	Ray Flick
Bergdoll	E. Homan
Apperson	George Davis
Interstate	N. A. Koch
Case	Henry Fallows
Case	W. B. Tait
Case	J. B. Bragass
Maxwell	A. J. Malin
Case	V. Faford
Case	Charles W. Karst
Kisselkar	Miss Anna E. Verga
Case	Mrs. Theodore Zirbes
Ford	Mrs. Sarah Hoffman
Premier	Mrs. C. V. R. Caldwell
Case	Mrs. D. Walter Harper
Overland	T. H. Gallagher
Apperson	W. C. Mullen
Benz	Sylvan Woods
Thomas	J. T. Sweeney
G. J. G.	Paul Theobald
Fiat	William M. David
Service	Carl Eldredge
Reo	W. J. Hayes
Bergdoll	H. Sharp
Bergdoll	L. Woodward
Pope-Hartford	G. B. Murtha
Chadwick	Charles Stretch
Flanders	Dr. E. Kelchner
American	Nelson Shaw
Garford	W. Eldredge
Garford	C. P. Sharpless
Cutting	B. H. Kirkbride
Cutting	Charles Walton, Jr.
Case	H. K. Keeley
Case	G. P. Dechant
Lenox	Charles Howard
Overland	William Bonham
Autocar	G. B. Headley
Michigan	Dr. M. R. Faulkner
Overland	W. A. Craig
Pope-Hartford	E. Heintzleman
Oldsmobile	George G. Meeley

Speedway Builders Honored

INDIANAPOLIS, IND., July 8—The people of Indianapolis last Tuesday night paid tribute to the living for what they have accomplished for their home city, when they gave a complimentary dinner at the German House for Carl C. Fisher, James A. Allison, Arthur C. Newby and Frank H. Wheeler, owners of the Indianapolis Motor Speedway.

There were about 150 guests present, including many prominent in the business and professional life of the city. Each of the guests of honor was presented with a copy of the following resolution, signed by each guest present:

"We, the undersigned, citizens of Indianapolis, very much desire to express to our fellow townsman and friend, our sincere appreciation of his magnificent work in furthering the best interests of our city. In thus acknowledging his worth, we congratulate him on his great accomplishments, wish him further unbounded success and promise him our hearty support and co-operation.

"We consider it a distinct privilege to publicly express, at least in part, those sentiments of high regard and esteem which, individually, have always been entertained by the people of our city, who have watched with close attention the magnificent growth of his unparalleled enterprise."

Grand Prix Distance Shortened

MILWAUKEE, WIS., July 7—A campaign to secure a really representative field of foreign-built cars and foreign-born drivers for the grand prix race in Milwaukee on September 17 is now being made by a special committee of the Automobile Club of America through its European representatives, the Automobile Clubs of France, Italy, Belgium, Switzerland, Canada, Austria, and R. A. C. of Great Britain and Kaiserlicher of Germany.

There are excellent chances that George Boillot, winner of the French Grand Prix, June 25 and 26, will bring his Peugot to America to compete at Milwaukee. Likewise hopes are given that Victor Hemery will come over with a Lorraine-Dietrich, while it is sure that Louis Wagner will drive one of the three Italian Fiats which will be entered, the team which worked together in the Dieppe race to be kept intact for Milwaukee.

There has been a slight change made in the conditions for the running of the Grand Prix, the distance being cut from 50 laps to 47 laps of the 8.725-mile course, making the mileage of the feature event 409.075 instead of 436.25 as originally announced.

The road work is progressing satisfactorily and the course already shows much improvement. The placing of the start and finish line will not be done until the various straightaways are in a completed condition.

Fast Time at Wildwood

Freitag's Fiat Covers the Mile Straightaway in :43 2-5, Closely Followed by Menker's Klinekar

Buick Wins Handicap and 161-230 Event, Klinekar the 301-450 and Mercer the 231-300

WILDWOOD-BY-THE-SEA, N. J., July 4—The success of yesterday's roadability run to this resort was second only to that which attended the speed trials held this afternoon over the 1-mile straightaway course, which brought the 2-day carnival to a close.

A long time before the scheduled hour of starting an immense throng gathered along the speedway. The fact that it was an unusually hot day and that a majority of the spectators were compelled to stand in the sun did not act as a deterent. Both sides of the course for a distance of over a mile were lined with a perspiring crowd and the temporary grandstand erected, affording practically the only protection from the sun's rays, was taxed to capacity.

The contestants were for the most part Philadelphians who came down yesterday on the roadability run as non-contestants in that event. The program was a well-balanced one and the finishes were so close in a majority of cases as to keep interest keyed up till the finish. The large crowd was well taken care of, not an easy matter in the case of a course like the one here, where the temptation is to break out into the roadway in order to catch a glimpse of the cars coming, subjecting the over-enthusiasts to danger from the speeding machines; but the guardians of the course were on the alert and not a single accident occurred.

A feature of the meet was the dispatch with which the events were run off. Clarence W. Cranmer, secretary of the Quaker City Motor Club, starting judge of yesterday's run, acted in the capacity of starter and the races were completed without the irksome delays between heats that marred some of the races held here two years ago.

Fiat and Klinekar Divide Honors

Speed honors of the day were divided between William Freitag, in the Fiat, who in the trials for the one-mile record, flying start, negotiated the distance in 43 2-5 seconds, and John Menker, Klinekar, who made the fastest mile of the afternoon in a race, 55 seconds, in event No. 3. The record established two years ago by the Chadwick car remains unbroken, however, as at that time a mark of 41 seconds was hung up by the Chadwick.

Eddie Bauer, driving a Buick, proved the most consistent winner of the meet, capturing first place in event No. 1, the first heat and race in the final time trials. In the initial event Bauer was given a close rub by H. Baker, driving a Cartercar, the latter being only a car's length behind at the finish.

Harvey Ringler had a walkover in the second event, winning from C. C. Fairman, Klinekar, by the safe margin of 21 seconds. John Menker, Klinecar, cut loose in the third race and made the fastest mile of the day outside of the record trials. Menker finished in 55 seconds, his nearest competitor being Philander C. Knox, Jr., 9 4-5 seconds behind.

Preceding the races this morning was a "happy-go-lucky" run for ladies conducted by Mrs. D. Walter Harper. All cars were driven by women over a specially marked route through Wildwood and Wildwood Crest, with women passengers and officiated over by women.

Over at the sister resort of Cape May today 32 pleasure cars and 7 commercial vehicles paraded through the resort, prizes being awarded for the best decorated cars.

Summaries of the races here today:

Division 2-C, non-stock, 161 to 230 cubic inches

No.	Car	Driver	Time
1	Buick	Eddie Bauer	1:15⅘
2	Cartercar	H. Baker	1:16⅘
3	Empire	R. S. Smith, Jr	1:19⅘

Division 3-C, non-stock, 231 to 300 cubic inches

1	Mercer	Harvey Ringler	1:08
2	Klinekar	C. C. Fairman	1:29

Division 4-C, non-stock, 301 to 450 cubic inches

1	Klinekar	John Menker	:55
2	National	P. C. Knox, Jr.	1:04⅘
3	G. J. G.	W. C. Thiebaud	1:08

Time trials, free-for-all

1	Fiat	Wm. Freitag	:43⅘
2	Klinekar	J. Menker	:46⅘
3	Chadwick	C. F. Stretch	:50
4	Apperson	Geo. Davis	:53⅘
5	National	P. C. Knox, Jr.	:56⅕
6	Benz	S. Wood	1:00⅘
7	Marion	E. G. Harris	1:04⅘

Free-for-all handicap, first heat

First heat

1	Buick	Eddie Bauer	1:19
2	Cartercar	P. Baker	1:19⅘
3	Empire	R. S. Smith	1:21⅘

Second heat

1	Mercer	Harvey Ringler	1:06⅘
2	Marion	E. G. Harris	1:12⅕
3	Chadwick	C. F. Stretch	1:19⅕

Third heat

1	Apperson	Geo. Davis	1:06⅕
2	Fiat	Wm. Freitag	1:06⅘

Final heat

1	Buick	Eddie Bauer	1:15
2	Apperson	Geo. Davis	1:15⅘
3	Mercer	Harvey Ringler	1:16⅘

Special event

1	Marion	E. G. Harris	1:08
2	American	Ralph D. Earle	1:17

Rules for Farm and Ranch Run

AUSTIN, TEXAS, July 8—The motor car run from Dallas to San Antonio and return, which is to start July 22, and return to Dallas July 27, to be conducted under the auspices of the Texas Farm and Ranch Publishing company of Dallas, is attracting much attention not only among the people of Texas but other parts of the country. It is said to be the first event in which only farmers and ranchmen living on their own farms and ranches and driving their own cars are eligible as entrants.

The eligible cars embrace any touring car or runabout. Cars shall be divided into two classes according to body equipment, as follows:

Touring Car Class.—Touring cars shall be divided into seven divisions of Class A as follows:

Division 1 A, $800 and under; division 2 A, $801 to $1,200; division 3 A, $1,201 to $1,600; division 4 A, $1,601 to $2,000; division 5 A, $2,001 to $3,000; division 6 A, $3,001 to $4,000; division 7 A, 4,001 and over.

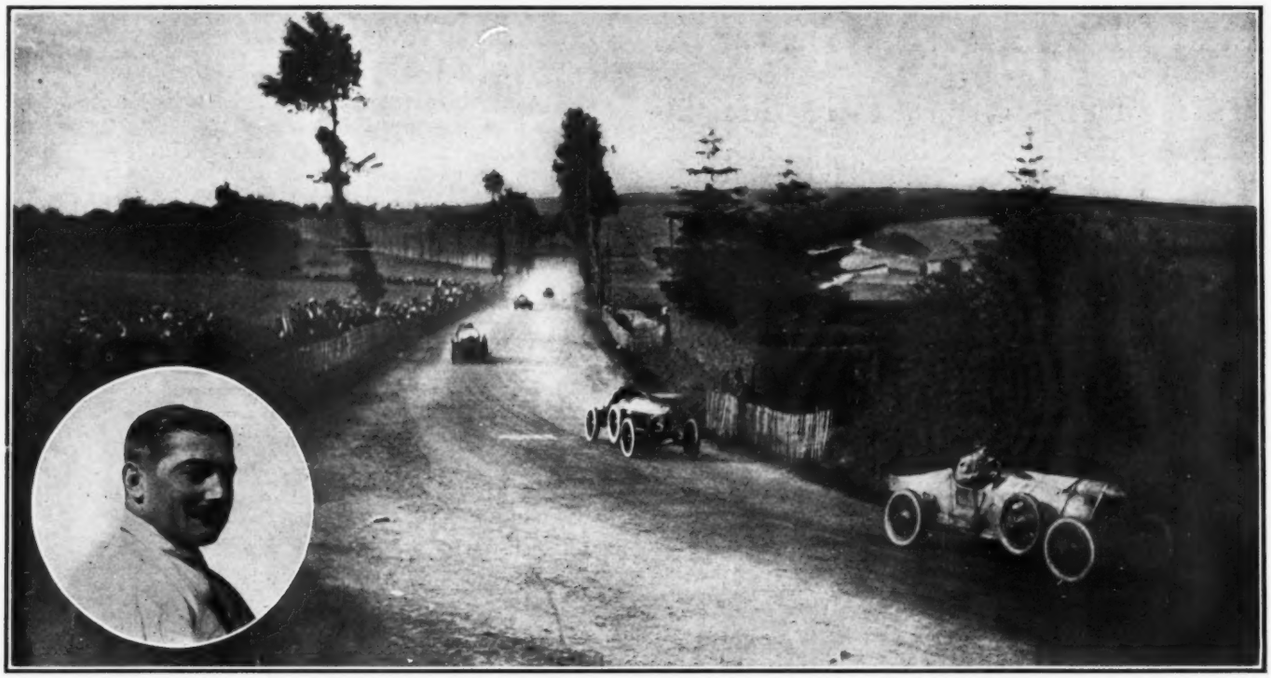
Runabout Class.—The runabouts, miniature tonneaus, surreys and single or double rumble-seated cars shall be divided into seven divisions of Class A as follows:

Division 1 A, $800 and under; division 2 A, $801 to $1,200; division 3 A, $1,201 to $1,600; division 4 A, $1,601 to $2,000; division 5 A, $2,001 to $3,000; division 6 A, $3,001 to $4,000; division 7 A, 4,001 and over.

The speed of contestants is: Division 1 A, 14 miles per hour; Division 2 A and 3 A, 16 miles per hour; Division 4 A, 5 A, 6 A, 7 A, 18 miles per hour.

Four States Tour Is Well Under Way

INDIANAPOLIS, IND., July 9.—Thirty-three cars got away on the second annual Indiana Four States Tour this morning. The first night control will be Ft. Wayne, Ind. A farewell smoker was given the participants in the tour by the members of the Hoosier Motor Club last evening. The tour, which is through Indiana, Ohio, West Virginia and Kentucky, is to last 16 days. It is noncompetitive. Seventeen Indiana factories are represented in the cars taking part in the run.



Five cars in view at one time, approaching the village of Eu. (Circle) Boillot, who drove winning Peugeot

Grand Prix Aftermath

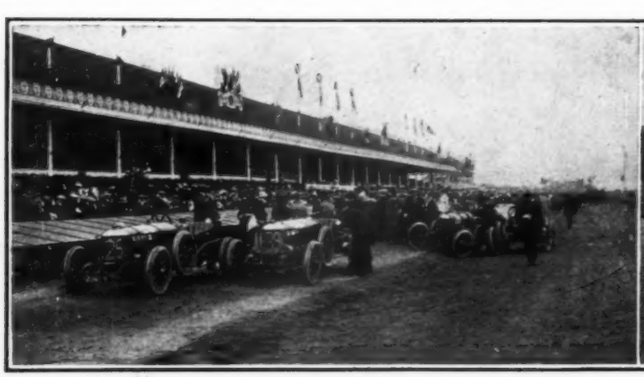
Bruce-Brown in Fiat the Virtual Winner, Although Deprived of Laurels by a Vicious Rule

Real Honors of the Race Captured by Sunbeams—Event a Failure from the Viewpoint of Attendance

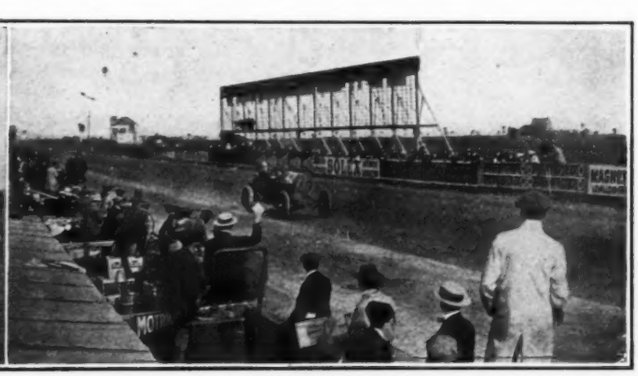
AS had been ardently desired by its organizers, the dual race held on the Dieppe circuit June 25 and 26 turned out before it ended—though with but a skinny chance between successful consummation and dire failure—a love feast celebrating and cementing the cordial understanding of England and France and a move on the chessboard extending this understanding to the English and French automobile industries, but it has not yet been charged that the wish in this case was the father of the result. Nobody has dared to insinuate publicly that the nut which came loose on the second day, spilling the gasoline of the car which stood to win, had been helped over night by an over-zealous patriot to prevent an Italian manufacturer and an American pilot from carrying away the first honors. But this charge is certain to be made in private, since trade animosities had been aroused with regard to the event and German, Italian, Belgian and American manufacturers had practically boycotted it, refusing to second the belated effort of the French industry for re-establishing its former prestige.

It is admitted, however, in the French press that the rule under which Bruce-Brown was prohibited from replenishing his tank more than once during the day's run, though the leakage compelling him to stop carried its own punishment in form of delay, should be amended, being too likely in another instance to turn a virtually earned French victory into unprofitable though not inglorious defeat. *L'Auto* in its issue of June 27 admits that Bruce-Brown should have won the Grand Prix, but consoles its sense of justice by the consideration that the Peugeot car which Boillot, with the aid of the accident, drove to victory, did not only beat the two other Fiat cars in the race on merit alone, but exemplified superior and more modern construction, in so far as the cylinder volume of its motor was only about one-half of the cylinder volume of the disqualified Fiat car, while the weights of the vehicles did not differ materially.

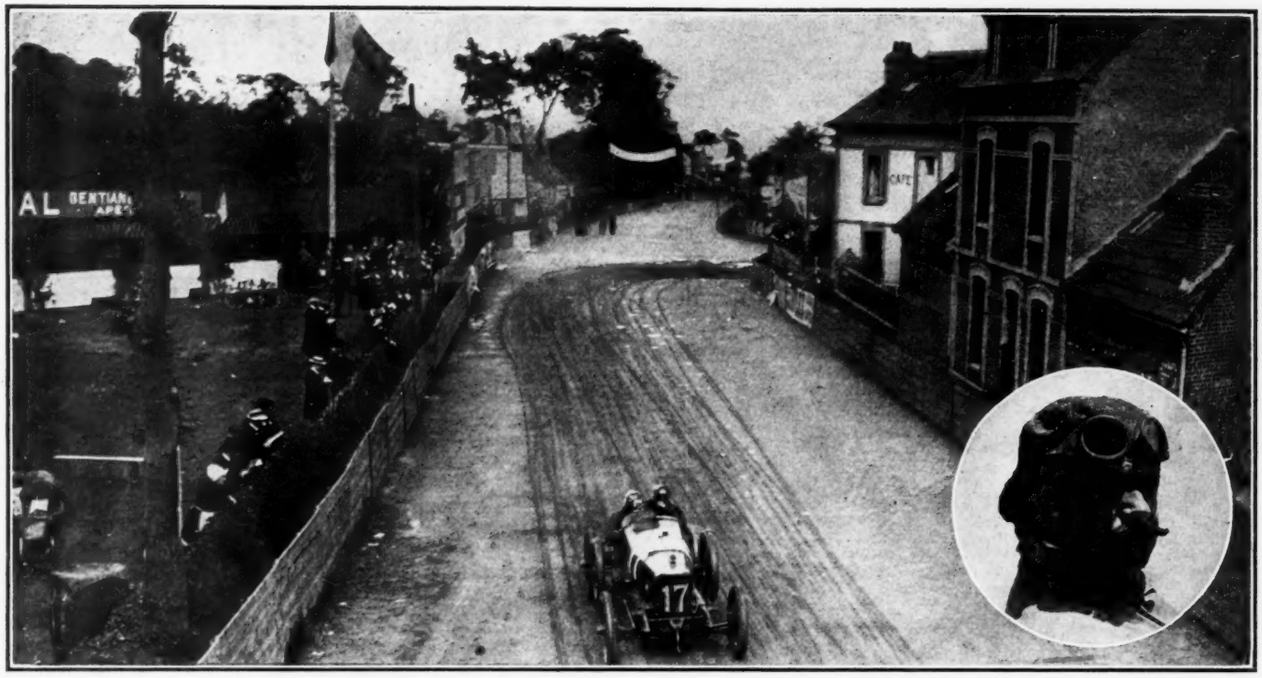
The classification of all the vehicles which finished in the double race is given in the appended table, from which it is seen that the racing interest is exhausted with the performances of the Peugeot car, the two Fiat cars, the Sunbeam team and the



General view of the start and portion of grand stand



De Palma in Fiat passing grand stand at 75-mile clip



Just beyond the acute-angled turn at Dieppe corner of course. (Circle) Rigal, who drove winning Sunbeam

Belgian Excelsior car driven by Christiaens, the latter being the only six-cylinder car in the race. The others who finished proved regularity at a more moderate speed, and this in the case of the diminutive Mathis car, built at Strasburg and the only German car entered, and in that of the Côte car, whose two-cycle motor required a public demonstration to inspire faith, was a matter of more than commercial interest. The largest share in the racing glory, viewed with an eye to the art of the drivers, the merit of construction and workmanship and the commercial significance—all in one comprehensive glance—goes by unanimous consent to the Sunbeam team that wins the cup for team regularity and with four-cylinder motors of a total cylinder volume of only three liters come within one-half hour of equaling throughout a distance of 1,550 kilometers the speed attained in the unlimited class with motors five times as large. France takes to herself some of this glory of the English manufacture, claiming Louis Coatalen, the chief engineer of the Sunbeam factory, as one of her sons. The merit of the Sunbeam car, says Mr. Faroux in *L'Auto*, lies more in a wonderful workmanship and finish than in any new or extraordinary features of design.

Several cars which were in line for success at the end of the first day are found wanting in the final line-up. De Palma was found to have replenished his fuel against the rules, being in company in this respect with Goux, one of the Peugeot team, who was far behind his colleague Boillot in speed, however, and both De Palma and Goux were counted out. The fast Gregoire cars were withdrawn, out of respect for the dead, when Bassaguana, mechanic to one and brother-in-law to another of the Gregoire drivers, had been killed in the only fatal accident of the event. The Rolland-Pilain car was well up in the race on the first day, driven by Anford and leading De Palma by three minutes, but at the start of the second day Anford's mechanic was incapacitated by fatigue, the spark plugs were found to be fouled, and Anford, in attempting to remedy this trouble, got the wires crossed and was unable to start the car. Pilain was called to assistance, at once discovered the crossing of the wires and corrected it with his own hands. According to the rules, this spontaneous act rendered it necessary that Pilain should himself do the driving, and while he did so he was not fit for the task and lost the place earned for his car in the race.

With regard to the performance of the Fiat team, it is brought out as one of the peculiarities which may develop in an event which is spread over two days that, though Boillot came out winner for both days, he was second to Brown on the first day and also second to a Fiat car on the second day, Wagner beating him more decisively on that day than Brown had done at the opening. As the event was intended as a trial for teams, with a view to bringing into relief the comparative merits of manufacture rather than the skill of drivers, it is considered an anomaly that the Peugeot team, two of which fell behind and did not

Start of Goux's Peugeot. Note how crowd encroaches

The winning Peugeot on the last lap of the big race

finish, could come out ahead of the Fiat team though beaten each day by one of them.

The attendance at the race was very meager, and *Omnia*, June 27 issue, comments upon the complete failure of the organizers in arousing popular enthusiasm. People are tired, says the editor, of having it demonstrated to them that the highest speed can be produced more readily by 200 than by 20 horsepowers. They want to know what the speed costs. Hence the construction of racing vehicles should be entirely optional, the distance should guarantee its robustness, and the winner should be he who produces the greatest speed for each liter of fuel consumed. On this basis, he thinks, racing might be revived in France.

FINAL OFFICIAL CLASSIFICATION OF CONTESTANTS
For Grand Prix of the A. C. F.

	h.	m.	s.
1. Boillot (Peugeot)	13	58	02⅘
2. Wagner (Fiat)	14	11	08⅘
3. Rigal (Sunbeam)	14	38	36
4. Resta (Sunbeam)	14	39	51⅕
5. Medinger (Sunbeam)	15	59	41
6. Christiaens (Excelsior)	16	23	38⅘
7. Croquet (Schneider)	17	31	39
8. Anford (Rolland-Pilain)	17	49	32
9. Wyse (Arrol-Johnston)	18	07	19
10. Duray (Alcyon)	18	28	55
11. Vonlatum (Vinot-Deguingand)	19	06	00
12. Esser (Mathis)	20	18	05
13. De Vere (Côte)	20	57	06

Unofficial Classification.

	h.	m.	s.
Bruce-Brown (Fiat)	14	28	13

For the Coupe de l'Auto (Cylinder Volume Limited to 3 Liters)

	h.	m.	s.
1. Rigal (Sunbeam)	14	38	36
2. Resta (Sunbeam)	14	39	51⅕
3. Medinger (Sunbeam)	15	59	41
4. Croquet (Schneider)	17	31	39
5. Wyse (Arrol-Johnston)	18	07	19
6. Duray (Alcyon)	18	28	55
7. Vonlatum (Vinot-Deguingand)	19	06	00
8. De Vere (Côte)	20	57	06

Market Changes for the Week

The market for materials pertaining to the automobile industry showed no important changes this week so far as prices were concerned. Steel remained unchanged, with the active business continuing. Among the largest orders was one for 3,000 tons placed by a radiator manufacturer in New England. Copper and tin were weak, the latter decidedly so in consequence of a panic in the London market for this metal.

Gasoline, after having risen to 20 cents last week, remained at this price. Other oils and lubricants remained also at their former quotation. Rubber showed the same strength it had displayed for the last fortnight and a fair business was done at $1.12 for Fine Up-river Para rubber. Tire scrap advanced 1-2 cent a pound.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, per lb.	.07	.07	.07	.07	.07	.07	.....
Beams & Channels, 100 lbs.	1.41½	1.41½	1.41½	1.41½	1.41½	1.41½	.....
Bessemer Steel, Pittsburgh, ton.	21.50	21.50	21.50	21.50	21.50	21.50	.....
Copper, Elec., lb.	.17½	.17¾	.17¼	.17½	.17⅛	.16¾	— .00¾
Copper, Lake, lb.	.17⅜	.17½	.17⅜	.17⅜	.17⅛	.17	— .00⅝
Cottonseed Oil, July, bbl.	6.84	6.86	6.86	6.84	6.79	6.80	— .04
Cyanide Potash, lb.	.20	.20	.20	.20	.20	.20	.....
Fish Oil (Menhaden)	.38	.38	.38	.38	.38	.38	.....
Gasoline, Auto, 200 gallons	.20	.20	.20	.20	.20	.20	.....
Lard Oil, prime	.85	.85	.85	.85	.85	.85	.....
Lead, 100 lbs.	4.50	4.60	4.70	4.70	4.70	4.70	+ .20
Linseed Oil	.75	.75	.75	.75	.75	.75	.....
Open-Hearth Steel, ton	22.00	22.00	22.00	22.00	22.00	22.00	.....
Petroleum, bbl., Kansas crude	.68	.68	.68	.68	.68	.68	.....
Petroleum bbl., Pa., crude	1.60	1.60	1.60	1.60	1.60	1.60	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Rubber, Fine Up-River Para	1.12	1.12	1.12	1.12	1.12	1.12	.....
Silk, raw Ital.	....	....	....	....	4.15	4.30	+ .15
Silk, raw Japan	....	....	....	....	3.70	3.70	.....
Sulphuric Acid, 60 Beaumé	.99	.99	.99	.99	.99	.99	.....
Tin, 100 lbs.	46.50	46.00	45.50	45.50	45.00	44.25	—2.25
Tire Scrap	.08½	.08½	.08½	.08½	.08½	.09	+ .00½

Legal News of the Week

Receiver Asks Permission to Sell Plant of Atlas Engine Works—Testimony Taken in Prest-O-Lite vs. Searchlight—Oil Company Bankrupt

INDIANAPOLIS, IND., July 9—A petition has been filed in the Superior Court by Fred C. Gardner, receiver for the Atlas Engine Works, asking permission to sell the property. The petition will be passed on Thursday. Mr. Gardner says that the company's liabilities exceed $100,000, that it would be impossible to obtain sufficient money to operate the plant and that to close the plant would mean a considerable loss. An inventory of the company's property has not yet been completed. The receiver has been authorized by the court to borrow $25,000 to meet the payroll and for current expenses.

Prest-O-Lite vs. Searchlight

CINCINNATI, July 3—Earl W. Griffin, as special master in the infringement suit of the Prest-O-Lite Company *vs.* the Searchlight Gas Company of New York and Coughlin & Davis, of this city, today took testimony in this case at the Sinton Hotel. Victor Gluchowsky, a member of the firm of Coughlin & Davis, was the principal witness, his testimony relating to the business of the firm in Prest-O-Lite and Searchlight tanks for automobiles. Winter & Winter, of New York, represented the complainants, and Herrlinger, Dixon & Stewart, of this city, represented the defendants.

Independent Refiners Sales Co. Bankrupt

A petition has been filed by the Oil Products Company of New York City to have the Independent Refiners Sales Company of the same city declared bankrupt. The indebtedness of the company is said to amount to about $10,000 and the assets to about $6,000. An offer was made recently by the company to pay off the creditors on a percentage basis, but it was decided that more money could be obtained by bankruptcy proceedings.

Decision Pending in Taximeter Suit

The suit of the American Taximeter Company *vs.* John Hefferon, John Kavanaugh and the International Taxameter Company of America was argued in the New York Supreme Court on Monday, July 8. Decision will probably be handed down in the near future.

The motion in the case is to enjoin Hefferon and Kavanaugh from hiring or using taximeters of any make other than the Jones taximeter, of which the plaintiff, as assignee of the patent, is the exclusive agent for the United States, and to enjoin the International Taxameter Company of America from leasing to them any make of taximeter.

Saul S. Myers argued for the plaintiff and Jacob A. Cantor appeared for the defense.

Horn Suits Not Filed Until July 3

Based on information received from G. V. O. Lansing, president of the Aermore Manufacturing Company, Chicago, Ill., THE AUTOMOBILE on June 27 stated that this company filed a bill in the United States Circuit Court, Chicago, against the New Era Manufacturing Company, charging infringement of patent No. 1,015,595, owned by the Aermore Company. Upon investigation in the courts it was discovered that this bill was not actually filed until July 3, although Mr. Lansing was notified June 18 by his attorneys that such bill had been already filed.

Demonstrations Are Passé

So Says Vice-President of the Willys-Overland Company—Thinks They Are Graft on the Part of Joy Riders —Gramm in New Company

TOLEDO, O., July 8—"That demonstrations are a thing of the past was evidenced during the Overland District Managers' Convention held recently at the Willys-Overland plant at Toledo," said Vice-President Bennett in a recent interview. "It was not the consensus of opinion that 'demonstrations must go' but that 'demonstrations have gone.' It has been a time-honored custom since the inception of the motor car to give demonstrations to prospective buyers, so that the purchaser might know what his car would do. In the olden days of the horseless carriage demonstrations were imperative because no one was sure how far a car would run without a breakage of some sort. Today the buyer knows what an automobile can accomplish (providing he is selecting a standard make) and does not ask nor require a demonstration. On the other hand demonstrations have been a "graft" on the part of joy riders and a drainage on the dealer. Many a person has entered a salesroom, feigning an interest in a car when the sole object was to secure a ride. The present-day motor car has time and again conclusively demonstrated that it will go anywhere and everywhere, surmount almost any obstacle, climb the steepest grades, and wallow through mud, sand and snow—that is why the public does not need to be shown."

Gramm in New Truck Company

LIMA, OHIO, July 6—The Gramm-Bernstein Company of Lima, Ohio, has been incorporated with a capital stock of $500,000 of which $200,000 is preferred 7 per cent. accumulative stock for the purpose of manufacturing motor trucks. The officers of the company are Max Bernstein, president; B. A. Gramm, vice-president and general manager; Harry O. Bentley, secretary and Fred Bizantz, factory manager.

This organization places Mr. Bernstein in charge of the financial affairs and Mr. Gramm in charge of the manufacturing and sales end. There will be a sales manager and an expert in charge of the publicity department.

The company has awarded the contract for new roofs to the buildings to be occupied by the concern. Factory Manager Bizantz is preparing specifications for the new machinery to be installed. The plant was formerly occupied by a paper mill.

First Lion Car Ready in 2 Weeks

ADRIAN, MICH., July 8—The Lion Motor Car Co., whose plant was totally destroyed by fire June 2, has been reorganized and within 2 weeks the first car will be ready for demonstration. It is announced that the new factory will be ready within 90 days. The Industrial Association of Adrian guaranteed $100,000 to keep the factory in the city. The Wing & Parsons Company has been taken over by the Lion Motor Car Company. The new factory is of increased size, covering 6 acres.

Stewart Motor Corporation Formed

BUFFALO, N. Y., July 8—At a special meeting held last week by the directors of the Stewart Motor Corporation, just incorporated here with a $250,000 capital, T. R. Lippard was chosen president and general manager of the new concern, while R. G. Stewart was selected as vice-president and chief engineer. R. P. Lentz, of Hartford, Conn., was chosen treasurer and secretary, while Robert W. Ingersoll, manager of the Firestone Tire and Rubber Company of Buffalo, will be sales manager for the new concern.

The latest addition to Buffalo's automobile industry has leased the large plant formerly occupied by the Niagara Machine and Tool Works at Jefferson, Superior and Randall streets for the transaction of their business. The new corporation also will occupy the four-story brick structure adjoining this plant and the power plant in the rear. Extensive improvements and alterations are being made on the building and orders are being placed for new equipment and machinery. Offices have been opened at 1056 Ellicott Square.

The Stewart Motor Corporation will engage exclusively in the manufacture of light capacity motor trucks. Arrangements are being made to have new trucks ready for delivery by September 1 and orders are being taken now for delivery at that time. About fourteen various makes of trucks will be made by the Stewart company, the maximum capacity of the trucks being about 1,500 pounds.

Republic Motor Company Formed

A large piece of property has been acquired by the Republic Motor Company, of New York, on Eleventh avenue between Fifty-sixth and Fifty-seventh street. It is the purpose of the company to build cars and sell them through a factory selling organization. The company has been incorporated under the laws of the state of New York. It is under the management of W. C. Durant, who, when interviewed by a representative of THE AUTOMOBILE, said: "This is the first of a series of ten factories to be put up by separate companies in different large distributing centers to build cars which will be especially adapted for their particular locality." The other cities selected are Philadelphia, Boston, Cincinnati, St. Louis, Minneapolis, Portland, Ore.; San Francisco and Los Angeles.

Automobile Securities Quotations

No startling developments were witnessed in the automobile department of the stock market during the past week. While no general trend made itself felt, the majority of securities advanced to a moderate degree. Some consolidation talk of the street relating to a possible merger of various tire manufacturing interests brought about advances in several issues of this class, notably in Goodyear stock, which rose 40 points. Automobile manufacturing securities changed little if any in their quotation, the most important advance being one of 9 points in the case of the Garford stock. The tone was steady and the volume of dealings satisfactory. Following table shows the prices this week in comparison with those of 1911 at the corresponding time:

	1911		1912	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., common	..	..	115	..
Ajax-Grieb Rubber Co., preferred	..	..	95	100
Aluminum Castings, preferred	..	..	100	..
American Locomotive, common	40¼	40¾	42½	43
American Locomotive, preferred	108	110	107¾	109
Chalmers Motor Company	149	151	145	155
Consolidated R. T. Co., common	5	10	15	18
Consolidated R. T. Co., preferred	10	20	..	59
Firestone Tire & Rubber Co., common	164	168	276	278
Firestone Tire & Rubber Co., preferred	102½	105	106	108
Garford Company, preferred	..	..	99	101
General Motors Co., common	53	54	31	33½
General Motors Co., preferred	88	89½	74½	75
B. F. Goodrich Co., common	238	240	77¼	75
B. F. Goodrich Co., preferred	115	116	108¾	109
Goodyear Tire & Rubber Co., common	210	215	302	304
Goodyear Tire & Rubber Co., preferred	104	105	102	104
Hayes Manufacturing Co	..	..	..	96
International Motor Co., common	..	..	23	25
International Motor Co., preferred	..	..	82½	85
Lozier Motor Co	..	..	50	60
Miller Rubber Co	..	..	155	160
Packard Motor Car Co	106	107	105	107
Peerless Motor Co	..	..	..	..
Pope Manufacturing Co., common	51	53	30	32
Pope Manufacturing Co., preferred	77½	79	73	74½
Reo Motor Truck Co	9	9½	8¾	9¼
Reo Motor Car Co	19	20	19	20
Studebaker Co., common	..	..	30	32
Studebaker Co., preferred	..	..	91½	92½
Swinehart Tire Co	..	..	99	101
Rubber Goods Co., common	88	93	100	..
Rubber Goods Co., preferred	100	105	108	..
U. S. Moto Co., common	40	41	3	3¼
U. S. Motor Co., preferred	82	83	13	13½
White Co., preferred	..	..	107½	108½

Trade News of the Week

Death of A. W. Harris, Oil Manufacturer, a Severe Blow to the Entire Automobile Industry

Matheson Affairs Finally Settled and Company Now on a Sound Financial Basis

THE entire automobile industry will mourn the loss of A. W. Harris, president and general manager of the A. W. Harris Oil Company, Providence, R. I., who died on Sunday, June 30, after a short illness. Not alone will his loss be felt in business circles, but throughout a wide social acquaintance as well.

Mr. Harris was a gentleman of education, having taken his degree at a prominent American institution of learning. The reputation for integrity which characterized his business dealings extended as well to his social intercourse.

In the early eighties Mr. Harris began the manufacture of high-grade steam engine and cylinder oil, building up what he characterized as his "smokestack" business until he was among the leaders in that line. When the automobile industry first began to attain prominence, more than a decade ago, Mr. Harris was one of the first to enter the field of supplying high-grade lubricants for gasoline motors.

So insistent was Mr. Harris on keeping up the quality of his product that the name Harris has always been a synonym for the highest standard in the lubricating oil field. The result has been that Harris oils are recognized throughout the world as among the best on the market.

Mr. Harris descends from a long line of Americans who have done things in the mechanical world. His uncle, William A. Harris, was one of the builders of the famous Corliss engine.

The main business office and factory of the A. W. Harris Oil Company are located at Providence, R. I., and there are branches in most of the principal cities of the country, its product being equally as well known in the Far West as it is in the Eastern section of the country. Mr. Harris leaves a wife and daughter.

Matheson Accounts Cleaned Up

When the Matheson Automobile Company, Wilkes-Barre, Pa., extended its capital to $2,650,000 2 years ago and took in the Matheson Motor Car Company, which was at that time in the hands of a friendly receiver as the result of a suit in equity brought by F. M. Quimby et al., about 2 per cent. of the creditors did not immediately obey the court order which declared for an adjustment on a basis of 50 per cent. stocks, 25 per cent. bonds and 25 per cent. cash. These creditors held back with an idea of obtaining all cash. The accounts have now been cleaned up and the reecivers are to be dismissed. The Matheson Automobile Company has been uniformly successful and has been working continually on a sound financial basis.

Sales Managers' Convention Postponed

The convention of sales managers to be held under the auspices of the Automobile Board of Trade will probably be put over until some time in September. Many of the sales managers are away on their vacations at the present time and a better attendance may be expected at that time of the year.

Car Designed on Dachshund Lines

ST. LOUIS, MO., July 8—A new car, to be called the Shomee-Dachshund, is to be made in St. Louis, by a company backed wholly by local capital. The name comes from the famous Missouri expression; "Show me." A dachshund is to be on the front of the radiator.

The car is to take a dachshund for a symbol because of its low center of gravity and low appearance. The machine will be overslung, and yet the designer, a St. Louisan, claims that the center of gravity will be lower and that it will have a lower appearance than an underslung car.

The machine will sell at about $1,800, will have Bosch and Atwater Kent ignition, left side drive, 120-inch wheelbase, dry multiple disc clutch, full floating rear axle, Continental engine, Rayfield or the designer's own carburetor and demountable rims. The first car is nearly finished. If it works right with a tryout the machine will be immediately put on the market.

An option on a factory site has been secured and 500 cars will be put out the first season.

Abbott Adds Four District Managers

DETROIT, MICH., July 9.—The sales force of the Abbott Motor Company has been strengthened by the addition of four district managers. E. D. Hand, who resigned recently as assistant sales manager of the E. R. Thomas Motor Company, has been given the states of Ohio, Pennsylvania and West Virginia. S. T. Henderson, who was formerly with the Bergdoll Motor Car Company, has been given the management of the sales for a number of Southern states, with headquarters at Atlanta, Ga. F. E. Westcott, formerly representative of the Reo Motor Car Company, assumes the control of the Indiana and Kentucky output. J. E. Warren, who has been connected with the Chalmers Motor Car Company for the past 4 years, takes charge of the Pacific Coast sales as special representative.

S.A.E. Meeting to Be in September

There will be no meetings of the metropolitan section of the Society of Automobile Engineers during July and August, the next meeting being scheduled for the last Thursday in September. Work is being pushed forward on the 1912 transactions which are expected to be ready during the latter part of this month.

Outdoor Show for Mound City

ST. LOUIS, MO., July 8—Beginning October 8 and ending October 14 the St. Louis Automobile Manufacturers' and Dealers' Association will give its second annual fall outdoor automobile show at Forest Park Highlands. This is the sixth annual show given by the association. Forest Park Highlands, a great summer resort in the heart of the city of St. Louis, has had a large sum of money spent upon its improvement this year, which improvements were made at the suggestion of the automobile trade of St. Louis in order to better suit the big resort for their purposes. The show held at the same place the first week in October, 1911, was a brilliant success, and the plans of the committee contemplate novel methods of advertising which will assure a larger attendance and greater success than last year. The show is open to all St. Louis dealers in automobiles and to accessory trade located anywhere. The show committee appointed consists of H. B. Krenning of the Dorris Motor Car Company, John C. Anderson of the Ford Motor Company, John Phillips of the Phillips Auto Company, Samuel Breadon of the Western Automobile Company, T. L. Houseman of the Overland Automobile Company and Frank R. Tate of the United Motor-St. Louis Company.

SUITS have been filed in the United States District Court by the Enterprise Automobile Company for alleged infringement of Dyer patents, Nos. 885,986 and 921,963, against John H. Hooper, Michael J. Bird, Washington Garage Company, David Rumsey, Alexander Krull, Ludwig Kraus and James Barnshaw.

Car Painting Not Costly

Renovating the Automobile No Longer The Expensive Proposition It Was In the Early Days

How Work May Be Done at a Minimum of Cost —Dressing Anew the Accessories

EXPENSIVE painting of the automobile is not always necessary. Plenty of good painting may be done and, as a matter of fact, is being done on a lower cost basis than at first glance may appear possible.

In some way the car owner has come to believe that the painter is an expensive man to visit when painting repairs are needed. Such is contrary to the facts, considering the value the painter is expected to give, and, indeed, does give.

One of the important items of expense attached to the painting of the car is that covering the cleaning up and making the car ready for the painter. To this extent the owner of the car can save himself, for it is manifestly cheaper for him to have the main part of the cleaning up done prior to taking the car in for repairs.

When the automobile was making its sensational entry into the world it was deemed wise to perform a lot of unnecessary operations upon the paint and varnish surface once the car came within the confines of the paint shop. The owner of the car, apparently to keep up appearances and add to the gayety of the situation, came bravely to the front and demanded that all things be done unto the machine to make it one of the finest, regardless of cost. Reasonably enough, he got what he demanded, and quite naturally paid plenty enough for it.

Cheap Work Not Necessarily Bad

But the former things have passed away and today most excellent painting is being applied to the car at a price, generally speaking, which a few years ago would have given everybody concerned a serious case of heart trouble.

To be sure, the automobile, when compared with the horse-drawn vehicle, is at the minimum figure a formidable proposition. However, as stated at the outset of this article, good painting can be done and is being done at reasonable cost.

The surface of the car when it shows a varnish film practically intact, with nothing more serious than shallow checks, is in no condition to need a series of primary coatings, unless the car is above the average and the owner is very willing to pay for non-essentials.

Simply lay hold of the body of the car and put it through a hard cleaning process, scouring all the grease flakes and sandpapering the surface. Surface dents and fractures should get a touch of some good lead and oil paint, and as soon as they have dried putty up with a hard drying putty. The day after scour all putty smears down level with the surrounding surface, using a block of rubbing brick dipped in gasoline.

Then select the body color, dust off and apply color, using a 2½-inch camel's-hair brush. Put on two thin coats, if necessary, in preference to one heavy coat due to make the work look brushy and rough. Then apply a coat of varnish color, which in due time is to be given a light rub over with a block of felt dipped in water and floured over with pulverized pumice stone.

Clean this surface up nicely and with a striping pencil run on some fine relief lines of a contrasting color to give a charm and distinction to the big fields of black, or blue, or green, or maroon or lake, as the case may be.

When this line work is properly dry apply for a moderately fine finish one heavy coat of clear rubbing varnish. For a still finer surface apply, in order, two coats of the rubbing varnish. Rub one or both of these coats carefully down with water and pumice flour and finish with a high-grade elastic body finishing varnish.

In the meantime fetch the chassis along, first by scouring every particle of dirt and grease from the parts.

This is a hard job and it takes patience and soap, and turpentine and crude oil, and sometimes a wash of sal soda to bring the parts out clean and decent to paint over. Then sandpaper over all, dust off and size the conditions up. Any breaks in the surface should get a touch of lead paint, and when this has dried the places needing it should be puttied with a hard drying putty.

Now apply a coat of color, then a coat of varnish color. Rub the gloss of this coat off with a clutch of upholstering moss or curled hair, apply the desired lines of contrasting color and finish with a single coat of heavy chassis varnish.

Along with this work must be taken into account mud guards, fenders, lamps, windshield brackets, radiators and other lawful accessories, all of which, as the car owner may elect, should be given their due proportion of renovating, painting and varnishing.

The automobile top is likewise in order for a process of renovation or for an application of some dressing material. Hand-buffed leather tops seldom require any treatment other than a gentle wash over with castile soap. Machine-buffed leather, when the enamel becomes worn off, will need, and should have, an application of some reliable dressing. All such dressings, however, should be put on very thin and uniform. Mohair tops brushed thoroughly with a whisk broom and then gone over with a soft brush, will come forth renewed and freshened up. Pantasote tops may receive some sort of a renovating treatment to renew them when but little worn, and if past this stage of renewal they should be given a thin, transparent dressing of an elastic nature. Pantasote curtains for railway coach use are often given a dressing of car-body finishing varnish thinned a little with turpentine.

Lamp and windshield brackets, etc., which are desired to go in some dark color corresponding to that of the car body, should, in the absence of a baking oven, be roughened with emery cloth and then given a lead priming coat. Then in due course they should be brought up with color, then one coat varnish color, rubbed, and finished with a coat of hard drying varnish.

Striping Automobile Bodies

Painters have accepted the fact that automobiles are not being, and are not likely to be, extensively striped. The plain lines in harmony with, and enriching the field color are the only ones that are being attempted in the best establishments. And, even with this narrow field of colors, the striping of an automobile is a considerable tax on the painter's ingenuity. It is difficult to find combinations of colors which give a striking or pleasing effect and still are in good taste. A few suggestions as to solving this problem are given herewith:

For medium and deep blue panels, fine lines of deep shade gold bronze, glazed with a light shade of ultramarine blue rivet attention immediately. Upon green fields of Naples yellow at one end and of primrose yellow at the other, glazed with No. 40 carmine or with English lake, the effect is enticing. Lines of chrome yellow glazed with English scarlet lake give a fine appearance.

Battleship gray, striped with 1-2-inch lines of aluminum, edged on one side with ivory black, coating the black in a fine line, reveal a splendid show of color contrast. Substitute a fine line of orange chrome for the black, or a similar line of English vermillion, and the combination produces a pleasing appearance. White striping on a gray field, lined on the edges with carmine, also imparts a distinguished air to a car.—From *The Carriage Monthly*.

Digest of the Leading Foreign Journals

Development of Automobile Fire Engines in Germany, While Split Into Electric, Gasoline and Gas-Electric Types, Agrees on Consigning Reciprocating Pumps to Scrap Heap—One of the Rotary Pumps—Subjects under Inquiry

FIRE ENGINE PUMPS—Among automobile manufacturers in Germany who build fire engines of one design or another, chosen largely in each case according to their own preferences, and who naturally wish to sell this product, and, on the other hand, the engineers of the municipal fire departments, who in some instances have to figure on utilizing the values in wagons and steam pumps which have been in use with horses, and who in all cases wish to suit the design of the fire-fighting implements to those ideas of fire-fighting work which have been developed among themselves and their men through their experience with the old-style equipment—there is at present a lively row which finds expression at public meetings and lectures as well as in the press. The main question involved seems frequently to be this, whether the firemen can be expected to do good work from day to day when they have to learn new fire-fighting tactics as well as the handling and care of new machines. Manufacturers wish to have all those possibilities of improved tactics which they think they have incorporated in their product considered in the light of improved efficiency, and the men who bear the responsibility for the fire protection prefer to await standardization of the modernized equipment, and of the tactics to be adopted with it, before abandoning the idea that the best automobile fire equipment for the present is one which, in everything but locomotion, can be used as nearly as possible in the same manner as the old equipment was used.

Under these circumstances the technical interest centers in the fire engine pump which was a slow stroke stream pump with reciprocating pistons, but which under the new conditions is preferably operated by means of a high-speed motor—either gasoline or electric—and, if only to avoid cumbersome gear reductions, should be a high-speed pump of one type or another. The high-pressure centrifugal pumps developed for this work resemble those known in American practice, but one type has been perfected in the Berlin fire service which is different. It is known as the *Rundlaufpumpe*, or rotary pump, and was designed in the first place by a well-known inventor, W. von Pittler, now deceased. Fig. 1 shows it in its original design and Fig. 2 gives an idea of its most recent development, showing to the right, as viewed from the driving side, a schedule or cycle of the piston action, which may be followed up by comparison with the reference letters in the sectional views to the left. Owing to the indistinctness of the drawings and the cursory character of the description, only a general idea of the mechanism can be gained. The author of the information first comments upon the advantage of piston pumps, that they are adapted for raising water from a lower level where no hydrant pressure is at disposal, while centrifugal pumps must be supplied with water to work with for starting, and refers to the disadvantage that the intermittent pressure stroke of reciprocating pistons subjects the hose to a constant oscillating motion in contact with the ground, which wears the hose out prematurely and which can only be obviated in part by the installation of an air chamber acting as an equalizer. He also mentions the need of safety provisions against sudden changes in the water pressure and the wear to which the pistons are exposed, especially when sand is taken in with the water. His description of the *Rundlaufpumpe* runs substantially as follows:

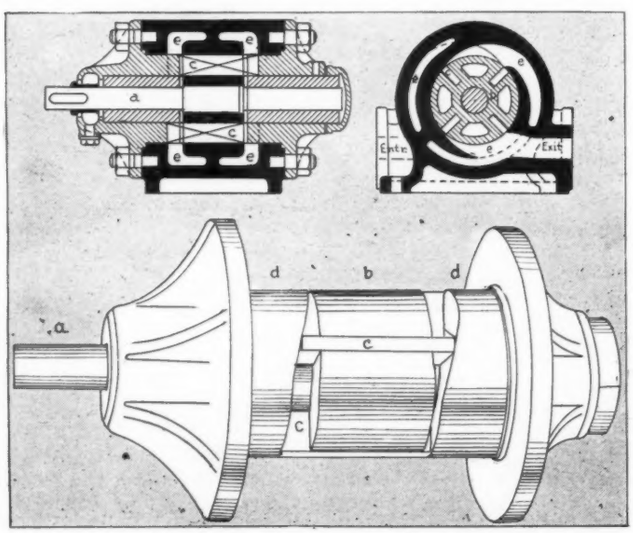


Fig. 1—Sectional views of rotary pump for fire engines as designed by V. Pittler—with side view detail of the rotary piston and adjacent parts

NEW ROTARY FIRE PUMP DESCRIBED

"It is in reality a piston pump with most of the advantages and disadvantages of this type. Its special merit lies in the possibilty of using it at very high speed. It consists of rotary elements operating in a housing, and its action depends upon alternating enlargement and reduction of the spaces formed between the rotary and the fixed parts, without use of ordinary pistons, connecting-rods or crankshaft. The effect is nevertheless that of pistons, being more or less intermittent.

"The interior of the pump consists of a through shaft (*a*) mounted in the extended bearing members noticed to the right and left in two longitudinal views under Fig. 1. This shaft carries a cylindrical body (*b*) in which four radial slots are cut out lengthwise of the body, forming pockets in each of which a rectangular hard-rubber plate is lodged, subject to axial displacement. When the shaft is turned, displacement is effected, because the ends of the plates are guided by contact with the interior end-walls (*d*) of the large bearing members through which the shaft passes, these walls being cut on an oblique curve and at all corresponding points spaced just so far apart that the distance between them is spanned by the length of each of the plates. The spaces *e* (see the sectional views under Fig. 1) are so disposed that those leading to the exit communicate at the right periods with the water which the rotation of the rubber plates brings under pressure, while those con-

necting with the entrance of the supply are brought under suction, and practically continuous flow from the suction channels to the pressure channels is thus effected. By having four movable plates, eight working spaces are produced and this arrangement in conjunction with high speed gives a continuity in the pressure almost equal to that effected in a centrifugal pump."

In the improved construction represented in Fig. 3 it is noticed that the movable plates are guided by means of obliquely placed ball-bearings K and that the number of the plates has been increased to six.—From *Der Motorwagen*, June 10.

Production of Quartz—The use of pure quartz is coming more and more to the front in art, industry and laboratory work. Mr. B. Daguerre tells in *Revue d'électrochimie et d'électrométallurgie* for April how it is produced. The crushed quartz mineral is placed in a graphite crucible, and the crucible is placed in an electric furnace operated with a current of 70 to 80 volts and 1,000 amperes. The current is tri-phase and acts through three converging carbon poles. The temperature is gradually raised to 1,800 degrees C., whereafter the quartz, now softened, is subjected to the action of an oxy-hydrogen torch.

Artificial Horn—Among the substances which industrial chemists are constantly trying to produce in better and better quality, with a view to the many purposes it may serve, for example, in aeroplanes and automobils, when perfected, artificial horn holds a place comparable to that of uninflammable celluloid. A new product of this nature, which is said to remain flexible and elastic at all climatic temperatures and unaffected by humidity, is obtained by mixing 50 parts of pure caseine, 50 parts of starch, 25 parts of gelatine, 0.25 parts of glycerine, 7 to 10 parts of paraffine and adding to this total quantity from 1 to 5 per cent. of alphanaphtal-sulfonic (sulfonic acid derived from alpha-naphtalene). The process is as follows: The caseine is dissolved in water containing borax. The starch is also stirred into water. In both cases the consistency should be that of a mush. The two mixtures are blended, and the gelatine, to which has been added the glycerine and the paraffine, the latter melted, is virogously stirred in with the rest. At last the sulfonic acid and, if necessary (for economy), inert matter are added. To remove the larger part of the water, the mass is rolled into sheets and, if it is required that all the water shall be removed, these are placed in alcohol. The anhydrated mass is then treated with acetate of alumina. If the substance must be obtained in bulk rather than in sheets the only available method is to unite a number of sheets under hydraulic or other strong pressure.—From *Revue de Chimie Industrielle*, June.

Tire Inflator—If sufficiently simple, inexpensive and reliable, a device which will permit the automobilist to inflate his tires by means of his motor power and without physical effort is likely to meet with popular favor. With this in view, the manner in which a device recently introduced in the French market under the name "Gonfleur Z" is mounted in the chassis as illustrated in Fig. 3. The pump has two cylinders and pistons. Stems extend upward from each piston, inside of the cylinders, of which only the lower halves are used for the working stroke, and the upper ends of the stems are yoked together by means of a crossbar capable of sliding up and down in slits in the upper portions of the cylinder walls. To the crossbar is secured a rod which may be pulled out, passing through the base piece of the pump, by means of a ring fastened to its lower end, thereby compressing the air in the cylinders and driving it out through the discharge valve and into the tire through a hose. A helical spring surrounds the rod and bears against the base. It is compressed by the working stroke and consequently takes care automatically of the suction stroke by its subsequent extension. Both the intake and discharge valves are in the base. The upper end of this pump is swiveled to one of the frame reaches L, as at T. A flexible steel band or chain B is secured at one end to the ring O, and at the other end to the other frame reach by

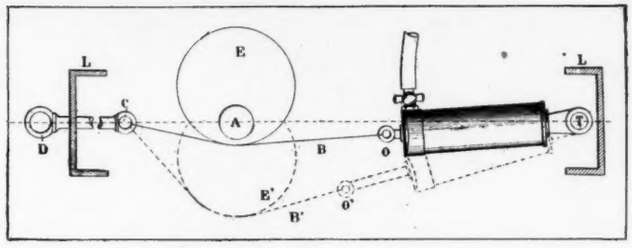


Fig. 3—Gonfleur Z type of mechanical tire pump

means of a clip, D and C. This band passes under the transmission shaft A and the spring in the pump holds it nearly straight until a small roller mounted by means of a suitable lug upon shaft A, so as to act as an eccentric, is pressed down upon it by the revolution of the shaft. The roller is represented in the illustration by the dotted circles whose positions indicates how the alternate tightening and releasing of the band operates the pump. It is stated in *La Vie Automobile* of June 22, from whose pages this description is taken, that the device is capable of inflating a tire, 33 inches by 3 2-3 inches, to a pressure of 10 1-2 pounds per square centimeter (about 65 pounds per square inch) in 45 seconds, but it is not explained where power can be taken off the transmission shaft without some interference with customary design.

Subjects Under Debate—Among the subjects which are at present being investigated mathematically in the European technical press are the following: In *Génie Civil* and *Gasmotorentechnik* the developing of automobile and kindred motors operating on the Diesel motor principle, by preheating the air supply and thereby getting very high temperature at the end of a moderate compression; in *Zeitschrift des M. M. Vereins* the best type of universal joints and the construction of centrifugal speed regulators; in *Die Turbine* the design of centrifugal governors.

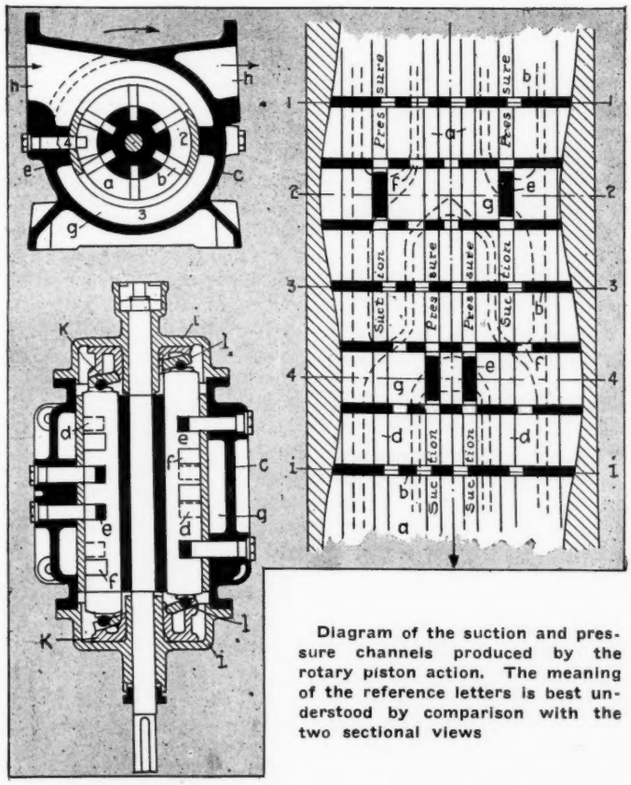


Diagram of the suction and pressure channels produced by the rotary piston action. The meaning of the reference letters is best understood by comparison with the two sectional views

Fig. 2—Lengthwise and cross-section of latest type of ***Rundlaufpumpe*** as used in German fire engines—an improvement on the model shown in Fig. 1

Fig. 1—Front of new Bosch factory at Springfield, Mass., showing railroad tracks coming up against one end of the building

Bosch's Modern Factory

Up-to-Date Shop Equipment and Highly Sanitary Construction Feature The New Works

Workers' Well-Being Considered a Production Factor

SITUATED in the heart of one of the greatest industrial districts of the United States and equipped with the most modern facilities in every respect, the beautiful new Bosch factory at Springfield, Mass., represents a basis upon which healthy and contented laborers may work with a high degree of efficiency. The force of the new factory comprises 1,000 men working on an available floor-space totaling more than 78,000 square feet, giving a space of 78 square feet per man in the establishment, which is illuminated and ventilated in an excellent way. These refinements constitute the most important advancement in the construction of the new plant over that of the old one.

The factory of the Bosch Magneto Company is a four-story building constructed of reinforced concrete, with a street front of 315 feet and a depth of 66 feet. Each story is 13 feet 6 inches high. The front entrance of the building is situated at the middle of the main street side and the way leads through this door to the main stairways which are four stories high and are crowned by the ventilating tower. Opposite the main stairway, on each floor, is a toilet room. From the central section, each floor extends to the end of the building where the ventilating louvers and fire escapes are located. The tower construction above each end of the building contains an intake fan and a cooling installation. The elevators are also situated at the ends of the building, and an electric dumbwaiter is provided which connects the main stockroom on the ground floor with those on the upper stories.

The most interesting features of the factory are: The shop equipment of the plant, which consists of the latest products of machine tool manufacture and includes many tools developed by the Bosch company for its own special uses; the arrangements for ventilating the building, heating the air in winter and cooling it in summer, besides keeping it free from dust, and the power plant.

Details of Ventilating System

In designing the ventilating system, the Bosch company has made a step which puts it in a position to rival the great metallurgical manufactories in Rhineland, Germany, which are famous for their sanitary construction. The fresh air is drawn in by means of two fans, on the two ends of the roof, which force it downward and through the workshops, whence it is expelled by the two large exhaust fans in the ventilating tower, Fig. 2. The quantity of air thus circulated is regulated by louvers, Fig. 4, placed between the work shops and central exhaust flue, and other louvers which are located in the walls of the stairways in the north and south ends of the building. The capacity of the exhaust fans is variable from 50,000 to 200,000 cubic feet per minute, while the intake fans can each deliver 3,000 cubic feet a minute.

In winter, only the exhaust fans are operated, so as to change the air in the shops twice each hour. This action draws in fresh air through 6-inch pipes which extend along the ceilings

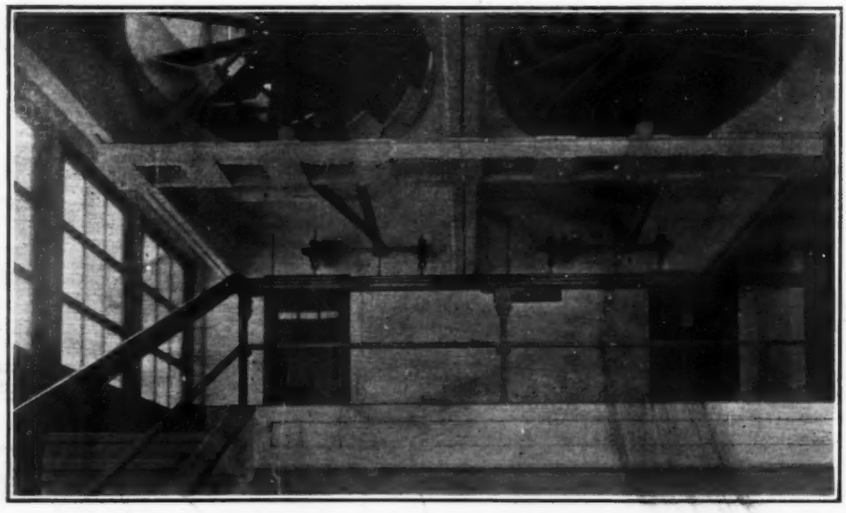


Fig. 2—Exhaust fans over stairway, expelling 50,000 to 200,000 cubic feet of air per minute

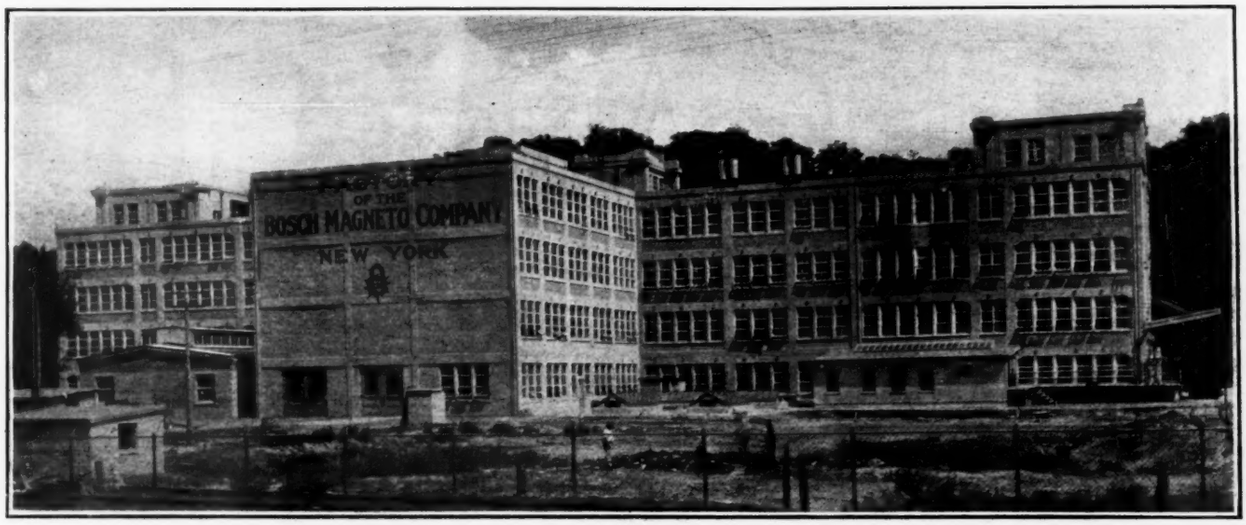


Fig. 3—Rear side of Bosch Magneto Company's new Springfield plant, with platform for unloading railroad trains at the side

Reinforced-concrete factory is well designed and equipped. Elegant outside combined with practical and sanitary interior. Average floor-space per workman, 78 square feet. Fresh air throughout the year keeps the men efficient. The temperature in the factory is kept constant. Electric power and lighting used throughout the plant. Company manufactures many of its own special machine tools. Each magneto is tested and every operation accurately recorded.

and are slotted to permit the air to stream out into the shop atmosphere. This air, being cold, drops toward the floor and replaces the foul air which is exhausted through the louvers and by the fans. In the warmer season, when the windows are opened, the fresh air enters through them, and, as the temperature rises and the need for fresh air increases, the intake fans on the ends of the roof are operated.

During summer the exhaust fans are started 12 hours before sunrise, supplying fully as much fresh air as is necessary. This process also serves to cool the walls and posts thoroughly before work is started and keeps them so for some time. When the weather becomes so hot that a mere change of air does not cool the interior of the shops, the air, before passing through the louvers at the ends of the buildings, is forced through a cooling apparatus, Fig. 5. This installation consists of a series of spray nozzles keeping the chamber in which they are inclosed full of a cold mist which lowers the temperature of the air passed through it.

Heating Scheme is Adequate

An important feature of the ventilating system is that the air currents caused by it do not flow sufficiently close to the floors to raise the dust lying thereon. Incidentally, this arrangement of air streams protects the feet of the workers from cold and its effects.

The heating equipment equals the ventilating and cooling system in ingenuity. The hot air which is used to heat the shops passes through long radiator pipes at a low rate of speed, so that it radiates most of its heat. These radiators extend along the walls, but are separated by partitions from them as well as from the benches placed adjacent to them, the latter partitions being 9 feet high. This arrangement has the following effect: While the workers are protected against direct radiation from the radiator pipes, the air around the latter is heated and rises toward the ceiling, while fresh, cold air is admitted by way of the ventilator shield at the bottom of the windows. The hot air, rising, forms a wall which prevents the cold air from striking the workers and compels it to flow into the space surrounded by the partitions at both sides of the radiator pipes.

Wash and locker rooms are located in the central section, where they form a wing attached to the rear of the structure. A similar wing is attached to the front and it is this wing that contains the main stairway and toilet rooms. The latter are also well ventilated.

Electric power and light are used throughout the factory, being produced by a 280-horsepower Diesel oil engine which is connected to a 200-kilowatt generator. The motor power is transmitted in the form of electric energy conducted from the generator to the shop by the 2-phase, 4-wire, 60-cycle, 440-volt system. The lamps used in the shop when the necessity for artificial illumination arises are 20 and 40-watt units respectively. The main driveshafts actuating the machine tools are 60 feet long. Undoubtedly, these many refinements will tend to keep up, and, if possible, improve the quality of the company's products.

Fig. 4—Louvers regulating the quantity of air. Fig. 5—Air coolers in end towers

Putting Gears into Mesh; Tubes Blow Out Without Apparent Cause; Misfiring in One Cylinder, Motor Chokes; Smaller Radiators to Increase Efficiency; Looking for a Good Decarbonizer; Adjusting an E-M-F Clutch; Increasing Compression

Gears Do Not Mesh Correctly

EDITOR THE AUTOMOBILE:—The driving pinion in the differential set on my car is too deeply in mesh with the large differential wheel. I understand there is a method of curing this by inserting a gasket somewhere in the casing. Will THE AUTOMOBILE tell me how to do it?

Tonopah, Nev. TERRY SINCLAIR.

—You do not mention the type of car you are driving, so that there is a great possibility that you will not be able to make the repair on your car owing to a difference in construction. Taking an average method, however, the work suggested by you would be carried out as indicated in Figs. 1 and 2. The nuts shown in Fig. 1 are taken out and the whole casing containing the differential pinion bearing is removed. A gasket of the thickness that it is desired to pull out the pinion is cut and inserted between the two castings, as shown in Fig. 2. This will have the effect of drawing out the pinion, but the difficulty will not be altogether removed. The chances are that the large differential wheel will have to be moved closer against the small pinion to take up the wear on the parts owing to their wrong engagement. This can be done on some cars, but cannot be done on others. It will be easy to determine if the adjustment is possible in your particular type of car by examining the construction and method of supporting the large differential wheel. If there is an adjustment to move the gear wheel closer into mesh with the pinion it will be readily found.

Do Others Have This Trouble?

Editor THE AUTOMOBILE:—I wish to state my case and find out if there are any others in the same predicament as myself. My tubes, which are of a very well-known make with a good reputation, burst on the rim side and this nearly always happens when the car is standing idle. I have had this happen several times in one day. It started after I had driven my car its first 700 miles, the car and tires being practically new. I have had this trouble ever since. Patches will not cure it, as it rips open under the edge of any patch. I keep the tire fully inflated according to inflation table. The tires are of the clincher type and I have sent to the local agent, who renewed the sample casings I sent, but could not offer any clue to the cause of the trouble. I would like to know if any others are troubled in the same manner.

Lyon Station, Pa. MILTON SAUERMILCH.

—It is impossible to say without being on the ground. Other readers of THE AUTOMOBILE who see this may have had the same trouble and know what causes it. There is a possibility of the security bolts pinching the tubes when you put them into the tire nut, though it does not seem possible that this should happen so frequently. Try taking greater care when placing them in the casing.

Pinching very commonly results from the beads of the casing squeezing the inner tube between them, causing a blowout. Insufficient pressure is the principal cause for this.

One Cylinder Misfires Badly

Editor THE AUTOMOBILE:—Can THE AUTOMOBILE tell me what is the trouble with my car? On a recent trip, soon after starting out, one cylinder began to miss and I could not entirely overcome the difficulty even after changing the spark-plugs, looking over all the wiring and connections, readjusting the vibrator and, in short, doing everything I could think of. It would run along smoothly for a time and then the trouble would develop. The car has been driven only 1,100 miles and has had very careful handling. The compression in each cylinder is the same. The car is a model T Ford.

Portage, Wis. L. E. GRANT.

—Look for a leak in the intake pipe leading to the bad cylinder. There is a chance that the mixture is weakened by a leakage of air into this cylinder which causes it to misfire. Trembler fatigue is sometimes responsible for an elusive misfire. This is rare but should the trouble be traced to this the cure is a new trembler. Clean the contact points in the timer with a few drops of gasoline and be sure that the spark-plug in the missing cylinder is in good condition, both as regards its insulation and the gap at the electrodes, which should be only wide enough to admit the edge of a doubled business card. A mistake which is made occasionally by people who have taken the valves off the motor is putting the inlet spring where the exhaust valve spring should be. After becoming warm, the action of the exhaust valve is

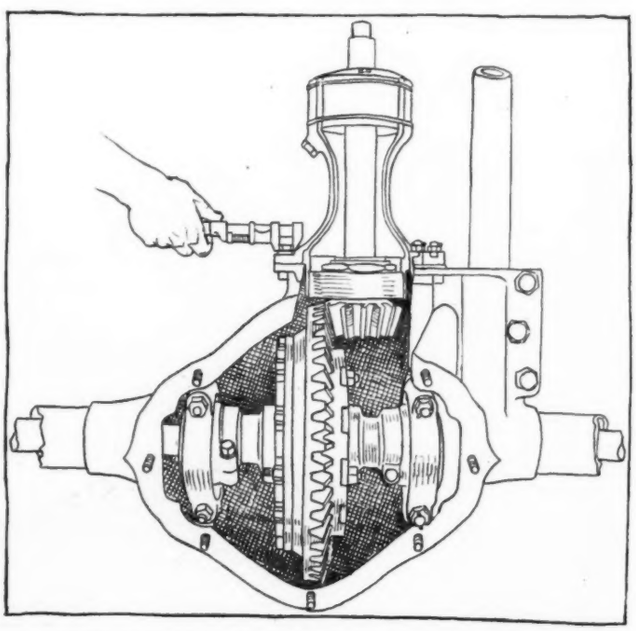


Fig. 1—Showing bolts which have to be removed in adjusting gear mesh

slower, owing to the weaker spring, causing a miss in this cylinder. On the Ford cars a very light trembler adjustment is necessary. If you have not tried a still lighter adjustment it would be advisable to try this. In case the valves have been ground, in spite of the short distance that the car has been run, there is the possibility that the stem of the valve is too long. It is a fact with these cars that the stems wear very much slower than do the valve seats so that a change of adjustment is necessary after a time or else the valves will open too early.

Chokes After a Fast, Stiff Pull

Editor THE AUTOMOBILE:—I have a 1911 Velie which is giving me a lot of trouble by choking up and skipping after a stiff pull of say 1-2 mile or more at the rate of from 25 to 35 miles an hour. I have tried all adjustments on both the B4, 1 1-4 and B5, 1 1-2-inch Stromberg carbureters, but without helping the situation any. The valves are in good condition as are also the piston rings. Can THE AUTOMOBILE suggest a possible cause for this trouble?

Easton, Me. H. R. DELAITE.

—If you are not bothered by air leaks of any kind, the whole trouble lies in an improper carbureter adjustment. It is entirely a matter of starting at the bottom and working through the adjustment rather than simply trying different adjustments after the motor starts to develop trouble. The correct way to adjust the carbureter is as follows:

After you have the gasoline turned on, first notice if the level is correct. It should be 15-16 inch above the rim on the bottom of the glass. If it is not, the level may be adjusted by turning the gasoline level adjusting nut M, Fig. 3. The level in the float chamber does not change as the nut M is turned but only after the motor has been started and stopped. If the level is not correct, it is a matter of turning the nut, starting the motor and then seeing if the level is correct when the motor is stopped. If not, the nut will have to be turned again and the motor started and stopped until the level is finally correct. Next, see if the air valve is seated correctly. It should rest lightly against its seating and this condition can be determined by tapping on the nut above the high-speed spring. If it does not seat, turn up the adjusting nut K, or, if too tight, turn the nut K down. Prime the carbureter until the float chamber is full. It will be noticed that some of the gasoline drops into the adjustable air

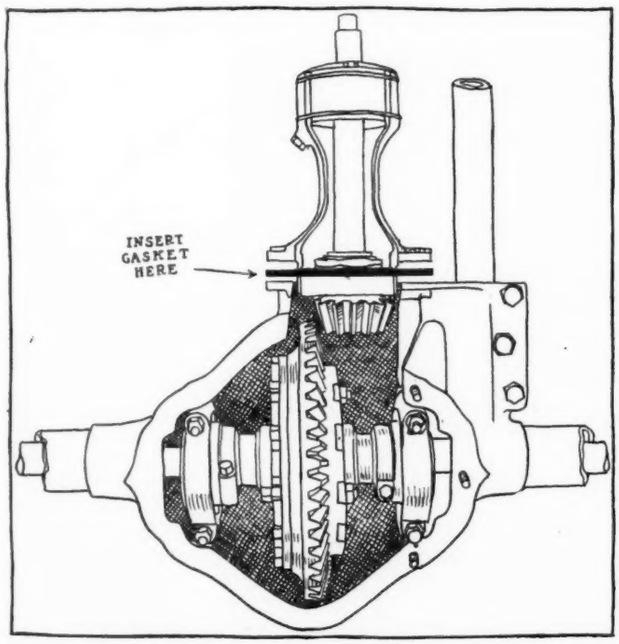


Fig. 2—Where the gasket should be inserted to bring gears into mesh

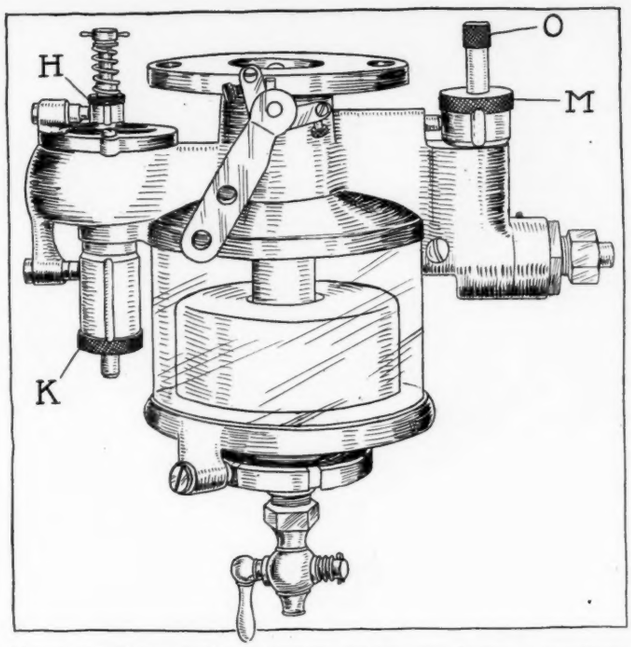


Fig. 3—Illustrating the adjusting points on B-type Stromberg carbureter

cup on the bottom of the carbureter. Turn this cup up as far as it will go and then turn it back two turns. On the average motor this will admit the proper amount of air, which regulates the gasoline supply. Next start the motor and turn the low-speed adjusting nut K with both the throttle closed and the spark retarded until the proper adjustment is secured. If the mixture is too rare, the engine backfires. In this case, turn up the nut K until the motor runs smoothly. It is wise to allow the motor to backfire at first, starting with this condition and screwing up on the adjustment until it runs smoothly. Next advance the spark and open the throttle gradually until it is wide open and if the motor backfires turn up the high-speed adjusting nut H one notch at a time until the motor runs without backfiring. Remember that the valve above the high-speed adjusting nut simply controls the air valve on open throttle or high speed. It should not be in contact with the nut above it when the motor is at rest. The seating of the auxiliary air valve is entirely controlled by the low-speed spring and there should be a space between the nut and the high-speed spring of not over 1-8 inch. It may be that, in adjusting the high-speed nut, in order to stop backfiring at high speeds, you will have to turn up the low-speed nut one or two notches. Do not do this unless you have to. After this be sure to see if the motor runs smoothly on a closed throttle.

The motor uses just enough gasoline to keep it going on low speed, and, as it increases in speed, it takes the necessary supply automatically. The motor suction draws air through the fixed air opening between the adjustable air cup and the bottom of the gasoline chamber, the air passing up through the mixing chamber through the spray nozzle, after which it is joined by the air entering through the auxiliary air valve, producing the required mixture. The more air that comes in through the adjustable air cup and the less through the valve, the richer will be the mixture, and *vice versa* Therefore, the low-speed spring should not be adjusted too tight. To change the spray nozzle, take off the draincock, whereupon the spray nozzle may be removed by means of a screw-driver.

Radiators Could Be Smaller

Editor THE AUTOMOBILE:—In reference to the communication by P. G. Tismer, I think that, in the main, he is wrong. The writer seems to ask a lot of questions but does not pause to

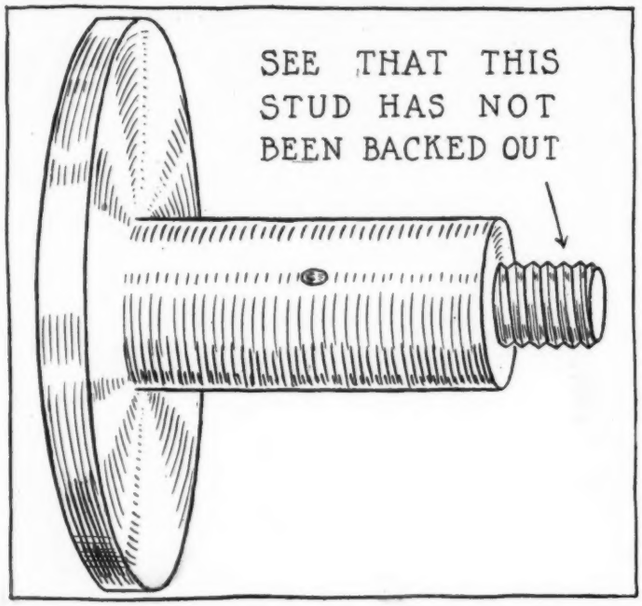


Fig. 4—Stud in flywheel end of E-M-F crankshaft which should be kept tight

take the obvious answer to many of them from daily practice in the automobile field. The Franklin car, for instance, is operated without waterjackets and operates very well indeed, but, nevertheless, it is a fact that the engineers of this concern were compelled to use their utmost resourcefulness in designing the excellent cooling system which they have today. The greatest cooling area which it is possible to submit to the cooling currents of air has been given the cylinders. The motor runs at a higher temperature than the water-cooled motor, but certainly does not reach the high temperature at which Mr. Tismer claims that his motor operates. I would like to know the make of the motor and horsepower. That lubricating difficulties have not developed is remarkable, considering the circumstances under which the motor is compelled to act.

What I do think, however, is that the modern gas engine could be made to operate at a slightly higher temperature and thus raise the thermal efficiency to some degree on account of less loss of heat to the cooling water. I would recommend that the merits of greatly reduced radiator area be investigated as I think that this is a solution of the problem of raising the thermal efficiency of the average touring car.

New York City. READER.

—A reduction of the heat thrown away in cooling the motor would be a very long step towards increasing the thermal efficiency of the motor, but practical difficulties in the way of steam intervene when the temperature of the water goes above 212 degrees Fahrenheit. The boiling radiator is a barrier in the way of reducing cooling area.

Car Has No Clutch Adjustment

Editor THE AUTOMOBILE:—I have an E.M.F. 30, 1910. I would like to know how to adjust the clutch. I have examined it and can find no way to adjust it, although it is slipping continually. How do you do it?

Parkersburg, W. Va. READER.

—There is no way of adjusting the clutch on the car of which you write. There are five things which could cause your clutch to slip and each of them is readily curable. As you offer no clue to which of these five your trouble is due, it would be best to take these up one by one in the order of their probability:

(1) Rivet projecting through leather. The rivets in the leather facing of the cone are supposed to be countersunk. This is essential as otherwise the clutch will not hold. When the metal sticks out beyond the leather there is a metal-to-metal contact which will not hold at all. It often happens that the rivet is only slightly countersunk when the car leaves the factory and after a time the leather wears away, leaving the rivet flush with the surface. The cure is to punch out the offending rivet, counterbore the leather for a short distance and put in a new copper rivet, being careful to get the head well below the surface after the rivet is flattened out.

(2) Leather glazed and somewhat hard. The best cure is to renew the leather. To do this, take the old leather as a pattern to cut out a new piece, or, better still, send to the factory for a new clutch leather. It will cost $2.00, but it will be correctly treated for the clutch facing. When putting it on be careful to counterbore the leather for each rivet. That is, make the hole in the leather first the same size as the hole in the metal against which the leather fits. Then, for a distance of 1-2 the thickness of the leather drill a hole with a slightly greater diameter with the same center as the first hole. This will give a seating in the leather for the rivet. Be careful in fitting the leather to stretch it on tightly or it will wrinkle and the clutch will seize. The probability is that, if the trouble has been the projecting rivet, as taken up under (1), the leather has become somewhat glazed, owing to the frequent slipping. The cure for a slight glaze is to thoroughly saturate the leather with neat's-foot oil. It must stand at least 24 hours after the application of the oil or the leather will not have time to take it all up. The clutch leather must be soft or the action of the clutch can never be right. It would be advisable, as long as you are working on the clutch, to give it this treatment of neat's-foot oil, no matter what the trouble may be.

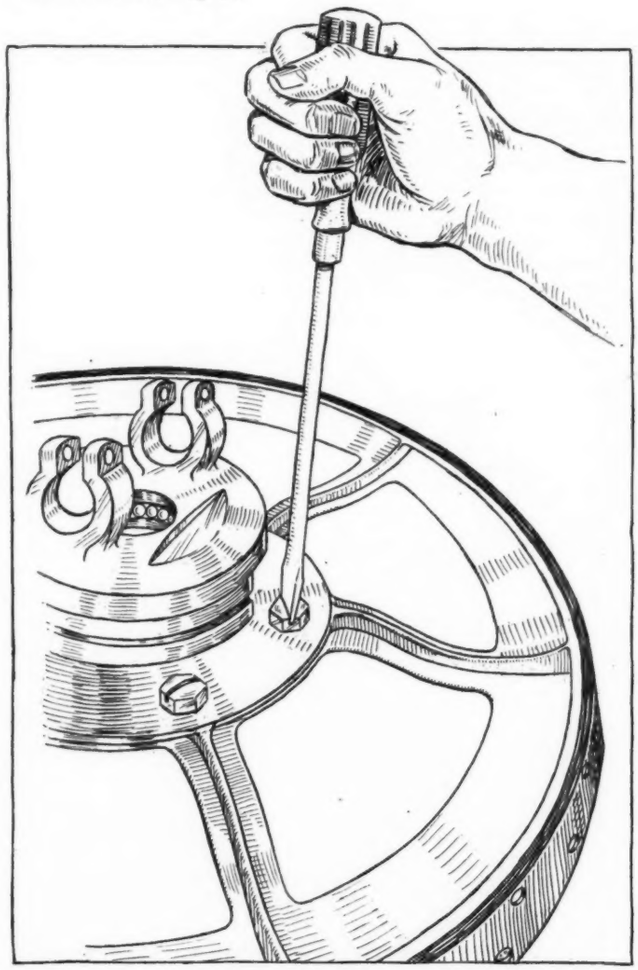


Fig. 5—Removing screw to get at the spring of the clutch used on E-M-F

(3) Leather worn away. In a case of this kind the only possible cure is to apply a new leather facing which may be accomplished under the directions given in (2).

(4) Crankshaft stud bolt backed out. In the flywheel end of the crankshaft is a stud, Fig. 2. The purpose of this stud is to hold the clutch in its correct relative position. When the stud backs out a short distance, as often happens after the car has been in use for some time, it does not permit the clutch to fully engage, and, as a result, it slips. The remedy is to turn this stud up as far as it will go. When the clutch is removed the stud should be tried and, if loose, tightened at once.

(5) The last possibility is that the clutch spring is broken. This is extremely unlikely, for you would have found it out before now. Should this be the case, however, the cure is to renew the spring. The new spring will cost very little and it is easily put in place. The bolts shown in Fig. 5 will have to be removed to get at the spring. In replacing these bolts tighten them alternately. That is, take up a turn on every other bolt going around the flange so that the strain falls equally on all of them.

Looking for a Decarbonizer

Editor THE AUTOMOBILE:—I often see dry powder carbon removers advertised. The powder is put into the cylinder after a run and is said to clean out carbon well. Do you know anything about them? I have been in the habit of using a little kerosene oil. The only objection to this material is that you have to clean out the crankcase after it is used. If one could find a really good preparation in powder form it would certainly be a boon. I do not care to try experiments and greatly prefer to learn from the other fellow's experience. I have a 1912 Overland touring car and after more than 1,500 miles on our none-too-good roads, am delighted with it. No carbon has formed as yet in the cylinders.

Bridgetown, N. S. W. A. WARREN.

—The method you use in injecting a little kerosene into each cylinder is very good and should prove very satisfactory. You will not have to renew the oil supply if you do not put more than a tablespoonful of oil into each petcock while the motor is hot. The kerosene will vaporize and dissolve the carbon. There are all kinds of good carbon removers on the market, some giving better results than kerosene because they are stronger solvents. Without an exception they cost more, however, and you should not need them except occasionally if you use the kerosene after each trip. Carbon deposits will never trouble you much, anyway, if you do not use an oversupply of oil and take pains in selecting the oil you buy. Never stint the price on this important article as poor oil will mean all sorts of trouble in the end, not only from carbon but from other evils of bad lubrication.

To Reduce Compression Space

Editor THE AUTOMOBILE:—I wish to reduce the compression space in my Ford 20-horsepower car. I have been thinking of putting aluminum plates inside the cylinder heads, bolting them on in good shape, the plates being cast to the shape of the cylinder heads. I would like THE AUTOMOBILE to tell me how much space to have between the plates and the piston heads.

Mellen, Wis. JOHN LUNDQUST.

—If you are fortunate, this change will cost you only about $2.00. Look at your cylinder at the point where the water pipe to the radiator leaves it and see if there is a small X on the outside of the casting. If so, you have one of the low-compression heads which can be exchanged for a high-compression head at a cost of $2.00 if you take the matter up directly with the Ford people. Aluminum melts at 1,157 degrees Fahrenheit and would not be suitable for use within the cylinder as the temperature at the time of combustion runs considerably above this and the waterjackets may not be able to take care of the extra plates fast enough to prevent trouble. Soft gray iron would be more suitable if you intend to put anything

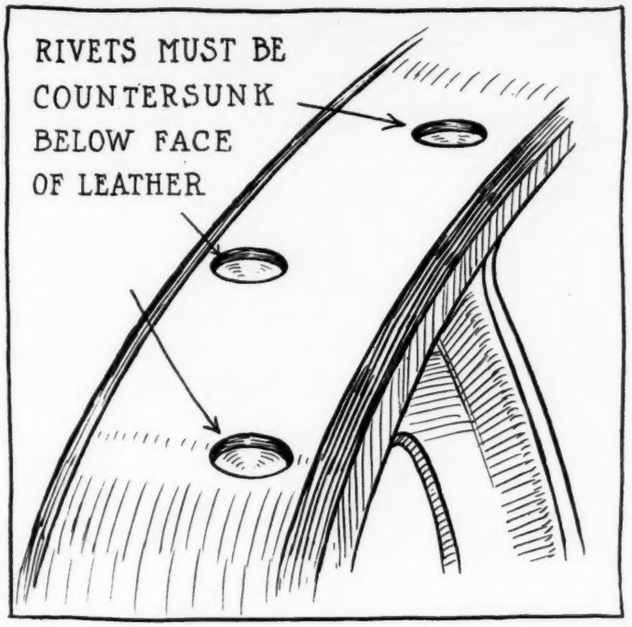


Fig. 6—The copper rivets must always be below the surface of the leather

in the cylinder, although it is not advisable. The amount of space left above the piston would depend on the extent to which you wished to increase the compression. For racing purposes, this could be as much as 90 pounds. The way to determine the volume of extra metal to put into the combustion space is as follows: Measure the compression that you have now in the cylinder. Call this P. Measure the present volume of the compression space as nearly as you can by putting the piston on upper dead center and filling the space above with heavy oil and then measuring this. The way to proceed with this is as follows: Take a gallon, exact measure, of heavy cylinder oil and weigh it. Then pour in enough oil to fill the entire compression space when the piston is on the top dead center of the firing stroke. Now weigh the oil that remains. The former weight of the oil divided by 231 will equal the present weight of the oil divided by the cubic inches remaining in the can. 231 less the latter quantity will be the volume of the compression space, V. The volume of metal to be added to the cylinder to increase the compression D pounds would be

$$\frac{DV}{P}$$

A better way of reducing the compression space would be to plane off the lower face of the cylinder where it again fits against the crankcase casting and also to plane off the face of the cylinder head, making closer fits at both these points and permitting the piston to travel further up into the cylinder, thus increasing the compression. It is greatly to be doubted if you will find a perceptible gain in the running qualities of your car after you have changed the compression, except, perhaps, the engine will start more easily.

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Letters Should Be Signed

[THE AUTOMOBILE is holding a few queries and communications which have been received unsigned. If a correspondent does not wish his name published it is merely necessary to state this fact in the letter and a nom de plume will be substituted. As an evidence of good faith, however, it is required that all communications be signed. Those which have been received up to date will be held until the identity of the sender is known. All communications will be answered strictly in the order in which they are received.—EDITOR.]

Papers Read at the S. A. E. Convention

Shipboard Meeting Brought Forth Several Valuable Contributions To Automobile Engineering Science

Much of the Material Brought to Light Had to Do With the Commercial Phase of the Industry, and the Discussion Which Followed the Reading of Each Paper Was Particularly Interesting In That It Developed Many Additional Points of Value

Motor Sizes and Drive Ratios for Commercial Vehicles

By E. P. Batzell, S.A.E.

Showing Necessity of Sufficient Power in Motors Designed for Every-Day Truck and Delivery Work—Importance of Proper Gear

ONE of the milestones of the midsummer session of the S. A. E. on the Great Lakes, between Detroit and Mackinac Island and return, was the attention devoted to the most suitable designs of motor for different size trucks, as well as the work in standardizing truck wheel sizes and tires. The two moving convention spirits in this work were E. P. Batzell, who exploited the matter of motor sizes, and W. P. Kennedy, who dealt with standardizing wheels sizes and tires. The discussions on both subjects were exhaustive, particularly that on motor sizes, which brought responses from nearly every representative of truck concerns at the session. The general consensus regarding motors for trucks was that they are too large, consume too much gasoline, are too heavy and out of all proportion to the transmission parts. Every one concluded that it was an error to try to adapt a pleasure car motor to truck uses because the services are so different. In a pleasure car the motor works but a very small proportion of the time, whereas in trucks it is working steadily for 10 hours a day under load. This steady service calls for large crankshafts, large crankshaft and connecting-rod bearing surfaces, large crankcase parts and slower motor speeds. There was a general consensus of opinion in favor of lower piston speeds and the design of motors, to give high efficiencies at medium crankshaft speeds.

The question of permissible or advisable speeds in miles per hour for trucks came up for sharp discussion. Some held for 8 to 9 miles per hour for a 5-ton truck, as compared with 12 or 13 miles per hour by others.

Variations in Truck Practices

Mr. Batzell in his paper, "Motor Sizes and Drive Ratios for Commercial Vehicles," showed the startling variations in truck motor practices, drew attention to the errors of motorizing a truck with a power plant taken from a pleasure car and the expense of over-motoring. Space permits of publishing here only leading extracts from Mr. Batzell's paper, together with the views expressed in discussion by the members. The complete paper may be published later. The following are extracts, setting forth the general points of the paper, but leaving out all of the mathematical calculations required in demonstrating the necessary construction in a motor truck, as well as the numerous charts illustrating the results of various tests:

The question of the selection of motor sizes for commercial vehicles has not been discussed much or often. It may be discussed as to several different basic conditions. In this paper it will be taken up principally from the standpoint of general economy, this being presumably most vital in successful commercial car service. Under general economy there are not only economy in consumption of fuel and oil, but also economy in the initial cost of the motor and its whole upkeep expense. At first the consumption of fuel only will be investigated, as to its variation according to different motor sizes for the same work. By assuming equal working conditions whenever comparison is being drawn, one need not keep track of the total fuel consumption in every case, but of merely the consumption per developed unit of work.

The abnormally great variation of present truck motor sizes is obvious. Taking the motor sizes of trucks of equal hauling capacity, as shown this year at the principal automobile shows, one will find in the case of 1-ton trucks the piston displacement varying from 144 cubic inches to 350 cubic inches, and in the case of 3-ton trucks from 230 cubic inches to 570 cubic inches. Figuring the above volumes at an equal piston speed of about 800 feet per minute, the respective variations become: total piston displacement per minute of 1-ton truck motors from 100 cubic feet to 178 cubic feet, and of 3-ton truck motors, from 135 cubic feet to 264 cubic feet. Taking into consideration the difference of the weight of the vehicles proper, together with their rated load, the piston displacement per pound of this weight in the case of the 1-ton truck varies from 40 cubic inches up to 61 cubic inches, and in the case of the 3-ton truck from 21 cubic inches to 38 cubic inches per minute.

Efficiency Depends on Design

When a truck does a definite amount of work by using some 50 per cent. less volume of piston-swept cylinder space than a similar truck of another make, one motor may be developing less power per cubic inch of piston displacement than the other, or the power losses in the mechanism of one truck may be much greater than in the other. The efficiency of an automobile driving mechanism differs greatly according to the general constructive features incorporated. However, in many cases of well-built trucks the transmission of the motor power to the driving-wheels occurs under approximately equal conditions. Consequently the motors of different size, but developing the same power, are acting under entirely different conditions in regard to transforming their gas explosions into outside work.

The power developed per unit of piston displacement depends on the charge taken into the cylinder, the compression ratio, the heat losses, the carburation and gas mixture consistency, ignition, timing and a few other things. The present discussion refers only to common 4-cycle engines. The compression space in truck motors is frequently 28 to 30 per cent. of the total cylinder volume, as against 20 to 23 per cent., and sometimes less in

pleasure cars. Inasmuch as high compression motors develop at medium speed relatively more power than low compression motors, the difference in truck motor sizes can be explained in part by the difference of compression used. A variation of motor size within 5 to 10 per cent. of the piston displacement can be thus explained.

In certain cases it happens that a manufacturer uses a pleasure car type motor for trucks, either because the same motor is used also in his pleasure cars or because he is able to secure the motors on otherwise profitable terms. Putting pleasure car motors into trucks explains further why truck motor sizes vary so much. A comparatively small pleasure car engine is apt to have enough power for commercial car purposes in certain cases where otherwise a larger motor would be advisable; the high compression of the former assisting somewhat in power development. Such an engine, if kept working at comparatively slow piston speed, may hold out well and also prove sufficiently economical in fuel consumption, because it has a higher thermal efficiency than the low compression motor, providing it has a good volumetric efficiency. On the other hand, when an oversized pleasure car engine is used for a truck of comparatively small carrying capacity, the engine will have an abundance of power for even any extreme case of requirement during service, but most of the time it will be developing only a small part of its power capacity. Consequently this engine will work with very little cylinder filling by fresh charge, with small throttle opening, and the thermal efficiency will be low, as well as the mechanical efficiency, because the amount of power lost in the mechanism of the engine proper will be large as compared with the amount of power generated by the motor. Moreover, the initial cost of oversize motors is considerable, and they weigh more and take more space than motors of rational size and power for a given purpose.

Power Plant Should Be Adequate

It might be said that a larger engine gives better assurance against interruptions in service apt to occur from lack of power. This may be true in cases where severe requirements and hard work with large power consumption are anticipated. However, instances of abnormal use of power are not encountered very often, and it should not be considered good policy to fit all trucks of a certain carrying capacity with a power plant large enough to take it at high speed over hard roads on a steep grade. The proper way is to furnish trucks of a certain carrying capacity with power plants of different size to suit most economically the conditions to be encountered in the prospective service. If the selection of power plants is correctly made marked results in economy of service operation can be shown.

It has been already stated that relatively high compression raises the thermal efficiency. On the other hand, it means higher pressure throughout the moving parts of the engine, and consequently the losses due to friction in them become greater also. Moreover, at slow speed the heat losses through the cylinder wall, especially through that surrounding the combustion chamber, are greater with high engine compression than with low, notwithstanding the larger area exposed to cooling in the latter. In some instances these losses may more than offset the gain in the thermal elapsing of the engine cycle. At any rate, they limit the compression ratio, which is economical for commercial car purposes.

When considering the high compression employed in pleasure car motors it must be remembered that they are high-speed motors working most of the time with comparatively low volumetric efficiency. It seldom happens in pleasure car practice that the motor is run at slow speed with the throttle wide open, and when it does happen the duration of such running is generally short. The high-compression motor has sufficient time to recover from this severe working condition which imposes great requirements upon all its parts, and especially upon the cooling system. Pleasure cars, being driven at slow speed mostly with small throttle opening, or with larger throttle opening at higher speed, take only a small quantity of fresh charge into their cylinders per suction stroke, and consequently, notwithstanding the theoretical compression ratio, the compression pressures are comparatively low. This is because the absolute pressure at the end of the intake stroke is lower in a cylinder working with smaller volumetric filling. The commercial cars generally make use of slow-speed engines, which have a more complete cylinder filling by fresh gases, other things being equal. Therefore the high compression ratios, if used in them, would disclose much sooner the bad effects upon the engine parts from the higher pressures of the working cycle, resulting from the more complete volumetric cylinder filling, than if the pressure had been preserved at the average pleasure car values. Thus is established the advisability of a fairly small compression ratio in commercial car motors. Even if this slightly reduces the thermal efficiency, the prolonged life of the motor ought to offset it. Contrary to the nature of pleasure car work the commercial cars are run much more frequently under conditions requiring a fairly constant and large amount of their motor power for a long time. One cannot rely on relieving the motors from signs of overwork during easy runs which alternate with the periods of harder work.

Maximum Torque at Slow Speed

Torque—The volume of cylinder filling by fresh charge during 1-cycle period is closely interconnected with the engine's pressure diagram, it being supposed that the engine has reached the stationary state of its thermal balance, viz., its cycle heat exchange. The cylinder filling is likewise interconnected with the developed motor power and torque, the latter being equal to the mean diagram pressure, times the piston area, times the crank radius, times the mechanical efficiency of the motor. In most well-proportioned automobile motors the maximum torque is developed at very slow speed, the slowest at which the motor will run under full load. However, many features of motor construction, parts alignment, carbureter action, timing, etc., affect this in one way or another so that the point of maximum torque cannot actually be foreseen even approximately. As mentioned, the heat losses occurring during an engine cycle are considerably higher at slow speed, which reduces accordingly the thermal efficiency and the rate of power production per contained amount of fresh charge in the cylinder. If no heat were lost through the cylinder walls, the greatest pressure diagram area of the motor working cycle would be reached at the moment of greatest cylinder filling, perfect carburetion of gas mixture being assumed. But on account of the existing loss of heat this greatest area is located at certain higher revolutions per minute when the length of time per motor stroke, during which the cylinders are exposed to the charge, is reduced. This time should be reduced enough so that notwithstanding a less complete cylinder filling at the higher speed, the most favorable conditions of generating power from the explosive charge are had. These conditions are seldom obtained in practice. They require that the motor deliver considerable work at a low speed, when the latter does not influence appreciably the volumetric cylinder filling through choking in the intake valves and passages. In fact, the slowest obtainable motor speed under load with full-throttle opening would lie most often above the revolutions per minute at which the rate of reducing the heat losses equalizes the rate of volumetric filling decrease with rising speed.

When considering the cylinder filling purely theoretically, as the result of filling a compartment under influence of a pressure difference created by the suction action of a piston, the greatest volumetric filling corresponds to the lowest recorded motor speed. However, if a true reproduction of the motor performance is desired, certain practical points which might alter the former theoretical result must be introduced. One must separate the meaning of actual volumetric cylinder filling, which refers only to volume, from the best cylinder filling, as mentioned in this article. The second meaning is intended to denote not only the volume of gas freshly taken into a cylinder during

the inlet period, but also this volume adjusted according to the state of the air and gasoline mixture in regard to the capacity of power development by this latter. Although the greatest measurable volume of air and gas would be drawn into a cylinder at the lowest speed, the conditions of the air, of the gasoline, of the carbureter adjustments, etc., may be such that the most effective mixture consistency, considered from the point of power development per unit of volume, would appear at a somewhat higher revolution per minute. Consequently the point of the best cylinder filling would lie somewhere between the lowest obtainable motor revolution per minute and the revolution per minute at which the best mixture consistency is reached. Its location marks the point at which the decrease of volumetric filling is counterbalanced by the improvement occurring in the mixture quality. Moreover, the condition of some of the motor parts might exert an influence on the moment of best cylinder filling, deduced as the result of apparent power generating, when, for instance, leaky places around the valves, pistons, etc., permit the escape of a larger amount of gases at slower speed.

Changes in the Gas Velocity

The actual volumetric cylinder filling is represented by a curve which has a maximum at the slowest motor speed, gradually decreased up to certain much higher revolution per minute, and then begins to rise slowly once more. This last rising part of the curve can be explained partly by the inertia of the gases acquired during the suction stroke, the inertia increasing rapidly with the revolutions per minute. After a certain speed is reached the gas velocity is so high that a larger amount enters the cylinder during the latter part of the suction stroke; then the decrease is effected through greater throttling of the gas flow due to higher velocity. This would become particularly noticeable at high revolution per minute in motors with late inlet closing, and also in motors with earlier inlet closing, when their inlet valves are small and choke the passing gases considerably. The curve mentioned can also represent the elapsing of the best cylinder filling with the motor speed; in other words, this latter filling coincides with the volumetric one, when assuming that the carbureter delivers a mixture of best consistency from the lowest motor speed on, and that the motor itself is in good condition throughout.

Within practical limits the coefficient of friction generally decreases as the motor runs faster. Another item to be included in the mechanical motor losses is represented by the power required for driving the air fan, the oil and water pumps, the magneto, etc., which also increases with the motor speed. Whether the resulting percentage of total mechanical losses in a motor will increase, remain constant or decrease with the gain of speed depends on the relation between the above-named kinds of power losses. Were it possible for a motor to retain a constant pressure diagram area through a range of speeds, the respective torque curve would gradually drop or rise according to whether the mechanical efficiency dropped or rose. However, the pressure diagram area will almost always be reduced at higher speed, and therefore the point of maximum torque lies at higher revolutions per minute than the area maximum for the case when the percentage of mechanical losses is decreasing at rising speed; the exact location of the point would be where the decrease of diagram area is equaled and compensated by the simultaneous decrease of mechanical losses. On the contrary, should the percentage of the latter represent a value increasing with the motor speed, the maximum torque will be located at the point of greatest recorded diagram area, on the assumption that this corresponds to the lowest speed of which the motor is capable under full load, and that the functioning takes place properly. In the case of an irregularly acting motor, showing from the beginning a rising value of the pressure diagram area, the maximum of the developed torque will be located at lower revolution per minute than that of the area, and also at the point where the increase of one item is compensated by the decrease of the other.

At present many commercial cars are equipped with too powerful motors and with only two forward speeds. Reconsidering the statements of this paper for a case of a two-speed transmission one would find that here the motor must be more powerful than where a greater number of speeds are used because it has to have ample torque when the tractive resistance does not warrant the use of the low gear, but is greater than the average encountered. The single reduction in the drive necessarily being low enough to overcome the greatest expected resistance, and present practice seldom making it more than 30 to 1, or more than twice higher than the lowest ratio figured in the above example, in equally extreme conditions the two-speed transmission requires more than twice the developed motor torque of the four-speed one with a proper lowest ratio, determined in accordance with the description given above. Such an oversize motor would actually perform the service required, but without any consideration of desired economy. In many instances the motion of the vehicle would occur with a tractive resistance by far smaller than that which the motor can overcome with full-open throttle; consequently, the frequency and duration of its runs with partially closed throttle increase. An observation of such trucks in actual service conditions would make this plain, because there is hardly a chance of seeing them running with wide-open throttle, which indicates that the motor is not loaded to economical capacity. On the other hand, the road resistance might become too great to be taken care of by the direct-drive ratio of the car, with open throttle, necessitating the use of the low gear. This ratio might be so low that a very small throttle opening would suffice to develop the required power. Moreover, the speed of the vehicle would be reduced correspondingly, bringing the vehicle down to 4 to 5 miles per hour, or even less, whereas a much greater promptness could be maintained with the intermediate ratio of a three or four-speed transmission. The two-speed transmission involves extra expense, such as for fuel consumed, time wasted by slowing down below the speed corresponding to the actual requirements of the road conditions, large motor with interconnected inconveniences, etc., all for the sake of gaining a trifling simplification in the transmission construction. It is easily seen that the two-speed transmission is not satisfactory in commercial work.

Some Economical Requirements

It is to be noticed that the foregoing discussion deals with the question of the most economical motor size without consideration of the power consumed when accelerating the vehicle. It would be entirely wrong to base judgment as to essential motor size on an assumed rapidity and ease of get-away. A buyer can be influenced easily by a demonstration when a loaded truck is starting under way from standstill with second or high gear in mesh, although in reality ability to do this indicates merely uneconomical action during average service conditions. Starting, as well as the propelling of a vehicle, imposes certain requirements on the motor torque, not its power. The favorable shape of a motor torque curve has been explained, dropping gradually from the lowest revolution per minute on. This gives a double advantage in starting the car with the motor running comparatively slowly. On the other hand, it is often profitable to use flywheel inertia to assist in making the start or overcoming some other increased resistance of short duration. A torque curve having a rise at its beginning makes starting somewhat easier than the gradually dropping one because it is apt to give greater torque values in a certain range of revolution per minute after its maximum. Combination of the torques and flywheel inertia in connection with a slipping clutch gives a quicker start, with the faster running motor with the greater torque, but, as stated above, the rising and subsequently dropping torque curve shape is not favorable to economy and the distribution of drive ratios.

Quick acceleration in congested traffic is more important in a pleasure than in a commercial car; it causes some overwork

of the motor and adds severe requirements of efficiency of the general brake system, which ought to cause a stop at least as quick as the time of acceleration; otherwise a heavy vehicle with a great momentum gained by acceleration brings very undesirable conditions into traffic. It is proper to run a heavy truck with low gear in mesh in a tight place, when a comparatively small motor will develop sufficient torque and power to keep the vehicle within reasonable limits of acceleration without disturbing the general traffic order. At any rate, the question of acceleration can be introduced as an item of some importance into the selection of the proper motor size only in those circumstances when frequent stops and starts are anticipated during service. In all other cases it would prove of too little advantage to gain time by a rapid start with a larger motor in the car, as against the lack of economy due to running continuously under a small percentage of its power development capability. The possibility of frequent starts being practically excluded in the service of trucks of large carrying capacity one can omit entirely any consideration of power required for acceleration when determining their motor sizes. On the contrary, motors for delivery wagons, passenger buses, etc., should be selected so as to assure reasonable promptness during starts, which means using larger motors comparatively.

Returning to the motor size finally indicated as the result of the example figured hereinbefore for a 3-ton truck, its dimensions, 3 1-2 inches by 5 1-4 inches, seem much too small, particularly when comparing them with those of present practice. However, one is more accustomed to the latter, although they have been adopted without investigating actual normal and extreme requirements. As stated before, it has appeared safe to use an oversize motor in a truck; thus one did away with possible future criticism as to lack of power. With increasing attention being paid to economical performance in service, which ought to influence the scope and extension of commercial car application, the matter of properly selecting motor sizes according to service conditions rises in importance. It can cause not only a general revision of truck motor sizes, but introduce a greater variety of motor sizes for cars of the same capacity, of the same make, whereby different motors will be selected in accordance with prospective service. Thus one may become gradually educated to the fact that the use of a four-cycle, four-cylinder, 4 3-4 inches by 6-inch motor in a 3-ton truck regardless of the prospective service means at the least a serious disregard of economy. A buyer of commercial cars will do well to look into this side of the question to assure himself that the extra expense connected with the oversize motor remain within allowable limits. The proper solution of the question requires considerable experience and ability. Nevertheless introducing principles of "scientific management" into the matter of purchasing commercial cars is justified, not restricting their application to the organization and management. In this connection it may be mentioned that although this article deals with the question of motor size only, a similar investigation could be made of the other parts and constructive features of the vehicle.

Torque Determines Motor Size

It is of interest to consider in what cases motors of the present large sizes can be worked to their capacity economically, taking for example, a 4 3-4-inch by 6-inch motor in a 3-ton truck. This motor has a piston displacement of about twice that of a 3 1-2-inch by 5 1-4-inch motor, and ought to be treated as capable of delivering twice the torque of the latter under otherwise equal conditions, including piston speed. It can propel the loaded vehicle over a level road of 40 pounds per ton tractive resistance at a speed of 17.5 miles per hour; up a 10 per cent. grade with 100 pounds per ton resistance at a speed of 2.25 miles per hour; and the empty vehicle at 26.5 miles per hour. With the same lowest gear ratio as with the small motor this larger one can take the fully loaded car up a grade of 20 per cent. (11.4 degrees incline) with a tractive resistance of 200 pounds per ton, which corresponds to a soft, muddy road surface. There is no doubt that conditions might be met in practice when reliable service could be rendered only with a motor not smaller than this, but that does not justify its use in all cases. As to the methods by which the proper motor size can be determined, one can say that attention should first be paid to the developed motor torque and its elapsing through a wide speed range, leaving the motor power to play a secondary rôle. It is the required motor torque and not the required power which determines the economical motor size for a commercial vehicle, as well as the suitable drive ratios.

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Discussion on the Batzell Paper

C. T. Meyers, General Motors Company, in opening the discussion on the paper, said:

The views in this paper should be attractive to any one who has a truck. Motors in American trucks are too large for the loads they have to draw. The American motors are too much along the line of touring car types. They deliver far less than the maximum torque under ordinary conditions. We can reduce the piston displacement 33 per cent. in many of our truck motors and still have enough power. Mr. Batzell suggests for a 3-ton truck a four-cylinder motor with 3.5-inch bore and 5.25-inch stroke. I do not think this would give enough power with our gearset limitations. I think a motor of this size would be ideal in a 1.5-ton truck carrying a 2-ton load. After many experiments with a 3.5-ton truck with a 5x5-inch motor we put in one 4.5 inches square and carrying a 10.5-ton load, took grades of 3.5 to 4 per cent. on direct drive with a 6.5 rear axle ratio. I should like to give data we have collected on trucks to prove that the motor is rarely called upon to show its maximum torque. When using the too large motor we are burdening the truck with additional weight and making the owner spend too much for gasoline. Many important changes can be made in gearbox design. A motor truck speed of 13 miles per hour is perfectly feasible under many conditions, but the average truck of today operated over average city streets and average country roads by the average driver will not operate at the best advantage to the owner at such a pace. Our 5-ton truck works at 9 and 9.5 miles per hour. If all of these matters are taken into consideration by designers it is possible to make a good truck at less cost to the maker and owners.

David Fergusson, Pierce-Arrow Motor Company, said: The motor should be made as small as possible in order to do the work, and in trucks it should be kept at as constant speeds as possible. Regarding motor size, it should be such that it has not to work at over 75 per cent. of its capacity for a 10-hour day; otherwise it will not endure as it should. Experience is the main factor in determining motor sizes in trucks. We have over 200 in daily service, many of which have been working for over 18 months. For 5-tons the motor is four-cylinder, 4.875 by 6 inches, and it gives good results. It is an easy problem to determine the necessary motor size for a commercial vehicle when you have the correct size for one truck model. I think 18 miles per hour for a 2-ton truck, 15 for a 3-ton size, and 12 or 13 for a 5-ton, satisfactory. The truck motor must last longer than that of the pleasure car; it should readily last for 10 years and many more. If you put in too small a one, it will not last that long.

Mr. Bachmann's Brief Comments

E. R. Bachmann, the Autocar Company: I have been with our company since the inception of the truck movement, and think Mr. Batzell has offered material to furnish the basis of some very valuable thought for commercial vehicle practice. The correct size of a motor for a truck calls for more care than in a pleasure car. The necessary motor size in a pleasure car depends on the speed that the buyer wants, whereas in the commercial field it is solely a problem of transportation, and the various truck parts must be so proportioned as to transport

goods at the lowest possible cost. Our company made an analysis of the different motors and trucks at the recent commercial vehicle shows, and the motor sizes in relation to truck load varied so much as to conclusively prove that the industry is in a very young state. In many trucks the motors are too large for the gearbox used; these must be proportioned. If a truck designer in laying out a truck installs a motor capable of taking all grades from the Atlantic to the Pacific on direct, he is wrong and his action is as absurd as that steam engineer who would use the same locomotive to transport merchandise over the Rocky Mountains that he would use on the plains.

Charles E. Duryea, C. E. Duryea Company: I have been building occasional delivery wagons since 1898, and I am in favor of keeping the motor speed low, and I have always aimed at designing a motor to give high torque at crankshaft speeds of 600 or 800 revolutions per minute. The difference between the high-speed motor and the low-speed motor is that between the race horse and the draught horse. We should have the draught horse type of motor. I favor the two-cycle type, as it fills its cylinders better at low crankshaft speeds and so pulls better than the four-cycle. You cannot get as much power out of a two-cycle at high speeds as a four-cycle, but more at low speeds.

J. G. Perrin, the Lozier Motor Company: The relation of tire life to truck speeds is a vital factor. The motor can be made to drive the truck at high speeds, but the life of tires under such service is limited. We must calculate the critical point in this regard.

Mr. Birdsall Gives His Views

E. T. Birdsall, Detroit, Mich.: I agree with Mr. Batzell. I favor a small high-speed motor with crankshaft, crankshaft bearings and crankcase parts of size for a very large motor. To be explicit, I favor using a motor of 3.75-inch bore and 5.5 or 6-inch stroke, and making these parts as heavy as would ordinarily be used in a 5.5 by 5-inch motor. This would do for a 3-ton truck, the motor operating at 1200 revolutions per minute. In the matter of truck speed in miles per hour it resolves itself solely into what you want to pay for tires. If, like some truck owners, you propose to use it for 18 months, working it 24 hours out of the day and at highest speeds, so by that time you will have got your money out of it and be ready to buy a new one, as some do, because they vainly imagine it is cheaper, then speed is everything. A 5-ton truck should not work at over 9 miles per hour.

Howard Coffin, Hudson Motor Car Company: The foundation of this matter is not a question of cylinder bore, but one of piston speed in feet per minute. It is a question of determining the speed limits for cast iron pistons to work against cast iron cylinders and the experience of big engine practice has settled this question, and why should we throw such information to the winds? Our basis of design for a truck motor should be the same as the basis of design on which makers of large motors have been following.

Henry Souther, New York City: The weight of the truck motor with relation to the weight of the truck is important. We made a mistake in the pleasure car field; we began with too light motors and then made them heavier. In the aviation field the makers started with too light motors and are now making them heavier; and now in the truck field the same error is being committed. The truck motor must run steadily and longer than the pleasure car one, and we must make the parts larger and heavier and use better materials. These factors must be taken into consideration in connection with low piston speeds. Such a motor will last.

W. A. Brewer, London, Eng.: In England we built trucks too light at the start. Now we use a 4-inch bore on 3- to 5-ton trucks. The cylinder sizes are not the fundamental point from which you carry out your truck design. With us the depreciation in trucks averaging 20 miles per day in heavy service, has been in the replacement of small motor parts or accessories.

Worm and Helical Gears As Applied to Rear Axles

By Frank Burgess, S.A.E.

An Outline of the Qualifications Necessary in an Efficient Worm Gear, With a Description of an Apparatus for Testing Same Before Installation

FRANK BURGESS by reading a paper on "Worm and Helical Gears as Applied to Rear Axles" struck a responsive chord in many listeners, and the discussion which followed the reading of the paper was comprehensive. The paper is as follows:

European practice, extending over a period of 15 years, has given ample evidence of the eminent success of the helical type of gearing, and I feel confident in saying that in the near future a large percentage of the cars in the United States will be equipped with this drive. Mileage records of 50,000 to 124,000 have been established.

Regarding the terms worm, helical and spiral I would say that spiral gear is the term commonly given to a gear the teeth of which have a uniform twist parallel to the axis, although for technical correctness the word helical should be used instead of spiral. A spiral is a line generated by progressive rotation of a point around a fixed axis, with a constantly increasing distance from the axis. Two forms of the spiral are the plane and the conical. Kent states: "When the axes of two helical gears are at right angles, and a wheel of one, two or three threads works with a larger wheel of many threads, it becomes a worm gear, or endless screw, the smaller wheel or driver being called the worm and the larger or driven wheel the worm wheel."

I suggest standardization of terms, and that to avoid confusion any gears of the helical type transmitting motion with shaft angle at 90 degrees, with a speed reduction less than 10.1, be termed right-angle helicals; and with any other than 90 degrees shaft angle the term helicals, stating specifically the exact angle of shafts. If shafts are parallel the term helical spurs should be used.

As the term right-angle helical is not as convenient as the term worm gear, and inasmuch as for automobile work most ratios will be less than 10-1, with 90-degree shaft angle, I would suggest the term helical gears as most appropriate. Otherwise it would be better to use the general term worm or worm gear to include all reduction ratios, even as low as 1-1. This matter should be settled promptly one way or the other.

The History of the Worm Gear

Worm gears were used at an early date. Archimedes is credited with the invention of the screw in 250 B. C. for the purpose of launching a large vessel built under his direction. Hero of Alexandria in 150 B. C. showed the screw in several forms of his spiritalia. About 1600 Jacobi Bessoni designed a rude lathe for cutting wooden screws. Important improvements in screws and screw-cutting machinery were made by Jesse Ramsden, Henry Maudslay, Sir James Barton, Sir Joseph Whitworth and William Sellers.

During the past 20 years great strides have been made in the development of helical gears. The adoption of these gears for parallel and right-angular drives has made practically a new element in machine design. Until this form of gearing was made commercial by the invention of special machinery suitable for economical production, there was considerable reluctance on the part of the manufacturers to adopt the helical gear.

The principal reason for the adoption of the helical form of tooth appears to be its peculiar quality of silence, regardless of

speed or load. With the best methods of design and assembly, great durability, strength and efficiency are obtained.

I believe that on all styles of cars in the United States the worm gear could be used successfully for rear axle purposes.

The successful worm gear should embody the following qualifications:

1. Cheapness of construction.
2. Strength for resisting shocks
3. Hardened and smooth surfaces for durability.
4. Material of a suitable composition to reduce friction.
5. Simplicity of construction and mounting.
6. Perfect bearing condition.
7. Noiselessness at any speed or load.
8. Reversibility.
9. Lightness in weight.
10. Efficiency in power transmission.

Granting that there is some argument against the worm in regard to trucks as to the dead axle proposition, this could be overcome by using the worm gear on each end of the axle, the same as sprocket wheels, having a double worm gear drive in place of the cumbersome chain drive. If at first slightly more expensive than the chain and sprocket drive, less repairs will more than make up the difference. Care should be taken to have accurate and first-class bearings, both radial and end-thrust.

Considerable discussion has arisen in regard to the relative merit of the straight and Hindley types, the latter having been first used by Hindley, of York, England. In my opinion both can be used successfully, although each has its own advantages and disadvantages. For most purposes, particularly where considerable power is to be transmitted, the Hindley has the advantage, but with ordinary machinery it is somewhat more difficult to obtain the same degree of accuracy that can be obtained in the case of the straight type.

From tests made there is no question but that there is a larger bearing surface on the Hindley type of worm than on the straight. Therefore this type of gearing will for the same pitch present a bearing of greater durability and manifestly heat less than the straight type, particularly under heavy load.

With first-class bearings the Hindley type has the advantage, as a smaller and lighter gear can be used, thus reducing expense, especially if made up in large quantities.

The hardening process for the worm should be such as to cause the least amount of distortion, careful methods of heat treatment being employed. The benefit of this is that the gear teeth of the Hindley type which it is impracticable to grind can thereby be lapped, making the teeth concentric with the hole, which is very essential in a worm of this type. The gear should have a mirror-like polish. In this way with hardened concentric polished tooth surfaces the Hindley type presents a better surface of contact than the best form of straight worm, even though the latter is finished by grinding.

Details of the Hindley Type

The gear is flanged on one side with eight lugs with hole in the center of each for mounting on differential casing. There is a slight shoulder on each side of this gear so that the differential casing will form a double web, stiffening the gear so that there is no opportunity for side vibration, thereby reducing the bronze metal to a minimum.

The worm gear should be made of a special mixture of hard bronze. The gear should be slightly polished after being cut to insure a perfectly smooth glazed surface to mesh with the hardened polished worm. This set of gears, properly housed, with ball bearings and the right lubricant used, will give an efficiency of at least 90 to 95 per cent.

A simple method of testing the gears for efficiency without elaborate apparatus is to run them in their regular housing, containing a bath of oil, subjected to load to be transmitted. If they do not have a high temperature after running several hours they indicate high efficiency and suitability for the given purpose.

Proper Testing of Motors, Determining Various Factors

By Herbert Chase, S.A.E.

Finding Friction Losses in Motor, Analyzing the Exhaust and General Standardization of Testing Methods Are Among the Needs of Present Practice

ONE phase of the recent S. A. E. meeting which will interest every car owner, every car maker and every car salesman, was the appointing of a committee to investigate the question of motor testing and submit a report on the possibility of standardizing to some extent motor testing. At present there is anything but standardization in this work, with the result that motor tests mean little and have no basis of comparison. The feeling is strong for uniformity for purposes of comparison. At present many of the tests have little meaning and scarcely any permanent value. They are often deceptive to everyone except the person making them, and often he is misled in his conclusions.

This subject was presented by Herbert Chase, in charge of the testing laboratory of the Automobile Club of America, who presented in printed form a voluminous report on the testing of a Pierce motor in that laboratory. This test was very exhaustive and took recognition of frictional losses in the motor, back pressure in the exhaust manifold, heat distribution, pressure drop in the intake manifold, thermal efficiency, constituents of exhaust gases, ratio of air to gasoline weight, power required to drive the motor when idle, and other details. Much of the data presented were more or less discounted, owing to the fact that in the test the regular Pierce-Arrow carbureter was not used and Designer Fergusson of the Pierce-Arrow Company claimed many inaccuracies of motor performance were due to fitting a carbureter not designed for the motor.

Friction Inside the Cylinders

In the matter of the ratio of air to gasoline it varied from 12.2 to 1 to 14.2 to 1 for wide open throttle and 10 to 1 up to 13.5 to 1 for part-open throttle positions.

The test showed that in analyzing the power required to drive the motor when idle, a large proportion of friction in the motor is due to the rubbing of the pistons and rings against the cylinder walls and the friction of gases passing into and out of the cylinders. When the intake and exhaust manifolds were off, spark-plugs out, compression reliefs out and valve covers off, it took 2 horsepower to drive the motor at 600 revolutions per minute, a little over 4 horsepower at 1000 revolutions per minute, 8 horsepower at 1400 revolutions, and 10 horsepower at 1600 revolutions per minute.

The net horsepower necessary to drive the motor when the throttle is wide open and the other openings to the cylinders are only those which the valves allow, as in the regular functioning of the motor when running under its own power, is as follows: At 600 revolutions 2 horsepower; at 1000 revolutions 6.5 horsepower; at 1400 revolutions 12 horsepower; at 1600 revolutions almost 16 horsepower.

When the pistons and connecting-rods were removed the horsepower necessary was as follows: At 600 revolutions one-fifth horsepower; at 1000 revolutions 1 horsepower; at 1400 revolutions 2 horsepower, and at 1600 revolutions 2.1 horsepower.

The test on back pressure in the exhaust manifold showed that it amounted to nearly 8 pounds per square inch at high speeds. The report suggested a dividing of the exhaust manifold in six-cylinder motors because two cylinders are exhausting at the same time, and before one cylinder has completed exhausting, the exhaust valve of the next cylinder opens and some

of the exhaust from the latter causes a considerable rise of pressure in the former. This, the speaker claimed, could be obviated by the divided manifold.

Some interesting facts on the operation of gasoline motors were presented in connection with the analysis of the exhaust gases. The manograph used in the tests showed that combustion in the cylinders is seldom the same in two consecutive cycles, and so the expelled gases are not likely to have the same composition. In the test the combustion was not perfect in any run, there being always some CO, carbon monoxide, present; and in some cases the proportion was almost as great as the CO_2. Again, there was in many cases a trace of pure oxygen remaining, as much as 2 or 3 per cent. of the latter existing side by side with the CO. This proved that the mixture within the cylinders was never absolutely homogeneous. Apparently some molecules of oxygen never came into contact with molecules of CO until the temperature was reduced to such a degree that combustion of the latter did not take place.

Finding Volumetric Efficiency

Volumetric efficiency is an important motor test, by it being meant the percentage of total volume gases drawn into the combustion chambers at different crankshaft speeds. To explain: If a motor has 300 cubic inches piston displacement it should, to be at maximum efficiency, raw in 300 cubic inches of gasoline mixture, but it rarely does this. The slower the motor works, the higher the efficiency, but almost proportionately as the speed increases there is a falling off of the volume of gases drawn in, or volumetric efficiency, as it is designated. In the tests the following volumetric efficiencies at different crankshaft speeds were obtained: At 300 revolutions crankshaft speed, the efficiency was 87 per cent.; at 1000 revolutions it was 79 per cent.; at 1200 it was 74; at 1400 it was 71 per cent.; at 1600 it was 68, and at 1700 revolutions it was 64 per cent.

Herbert L. Connell of the Packard Company, in his paper on standardizing motor testing and co-operating in this work, outlined the necessity for such work.

The great present need is for uniformity in the carrying on of each class of motor tests and in the reporting of the same. As conditions are now there is such a divergence of methods that even the most carefully developed tests are only of value for their individual conclusions, and it is almost impossible to link them with other tests for the purpose of drawing conclusions from a broader point of view or for direct comparison. The same condition existed at one time in the field of steam engineering. To meet this the American Society of Mechanical Engineers developed their codes of boiler and power plant tests. These codes have been revised at intervals as conditions and continued study dictated, and have been held as practically absolute and universal standards. Tests carried on under them give engineers an opportunity to pick out relative values, for there is the assurance that the results are really comparable. The buyer bases his specifications and conditions of acceptance upon these standard tests. Although the time has not yet come when the purchaser of a gasoline motor is given or demands standard tests and characteristic curves, yet that time may not be so very far off. A study of past and present announcements shows a tendency to this. At first there were the exaggerated claims of power which the public soon learned to discredit; then came the general rating by the very arbitrary A. L. A. M. formula, and now we notice numerous statements of the formula rating followed by actual brake test readings. The advantage of the old formula method was that it dealt with definite denominations only, and there could be no question as to the methods used behind the mysteriously locked doors of the experimental room. The inadequacy of the A. L. A. M. horsepower rating is well known, but some of those who are stating brake horsepower have based their claims on very low averages, doubtless for fear of reviving the old distrust of such ratings. This state of affairs is obviously unfair to all concerned, but until tests can be conducted in accordance with a code that is universally known to be standard, and to give comparative results, the conservative can hardly do otherwise.

To get back to the engineering standpoint, a very few examples will suffice to show the present state of chaos and the advantages of standard methods. The effect of atmospheric and barometric conditions on the action of a motor has often been observed, but one practically never sees these conditions mentioned in a report. In exhaust pressure measurements comparisons are now impossible because one investigator may have taken his readings 3 feet from the motor with the pressure tube flush with the inside of the pipe, while another may have used a tube extending some distance into the pipe, near the motor, and with the tube end beveled. It is not hard to imagine the effect the difference of position might cause, while in the latter case a velocity factor would be added to the pressure reading. It would really make but little difference if the tube were placed to get the average pressure or not, as long as the method was uniform in each case, for then the results would be comparative.

A standard length of brake-arm has been suggested. This length could be established as that found in the majority of laboratories and would mean only a minor change in the equipment of those not belonging to that majority. Of course, each engineer in his own laboratory knows the relative meaning of his own brake-pulls even without converting them into inch pounds of torque or to horsepower, but think how a standard arm would facilitate the quick grasping of results by the number of our consulting engineers who visit many different test rooms. So much seems ample to suggest the possibilities and need of standardization in this line, and to justify the S. A. E. in doing in its own field what the A. S. M. E. has done so well in power plant work.

Fields Open to Research

Other possibilities are open to a committee on motor testing after a code has been developed and while developing it. One of these is to act as an advisory board in broadly mapping out lines of investigation. This would apply especially in relation to the work being done at the leading technical schools in this country. Here we have well equipped laboratories and well trained men, but it is surprising to know the difficulty advanced engineering students have in settling upon a line of research. The difficulty of picking a particular field is not so great, but to know where to begin and how to get somewhere in the allotted time is the sticking point. Take the hypothetical case of the man who chooses the internal combustion engine. The chances are almost ten to one that his first thought is an investigation of alcohol as a fuel. Why? Because every one who has read the semi-technical magazines, and even the Sunday newspapers, knows that alcohol as a motor fuel is still an almost unsolved problem, from the commercial standpoint at any rate, and it is a peculiarity of youth that it desires to tackle something new instead of building up on an old foundation. Our student probably does not even dream that the engineers responsible for the creation of the smooth-running motor cars do not know the state or condition of the fuel entering the cylinders, and therefore he chooses a problem he knows exists. By the time his "credit" has been earned he probably has not developed a wonderful alcohol carbureter or given any very valuable data to the world, although he has learned a lot about running a balky motor. To carry the hypothetical case further, let it be assumed that the S. A. E. testing code is a standard and that the committee that devised it has been continued and has turned its attention to its advisory function. Our student who has chosen some kind of motor testing, and is further presumed to be in a laboratory which has adopted the S. A. E. code and co-operates with the S. A. E. program when practical, finds that he no longer has a wilderness before him, but that certain paths have been mapped out. Even if the time at his command is relatively short, he may work on a subdivision of a subject that will form a definite link in a definite chain of investigation. You will probably ask if the student and the instructor will take to such a plan. Observations and direct expressions of opinion are emphatically in the affirmative. The why and the how of the student appreciating suggestions in the choice of work has been

shown. As to the interest and care that would be given to the work after it was started, there is a psychological factor that will take care of that. Men reaching the point of such work have already learned to be careful, and by that time they have mostly gotten the engineering bug so that anything that looks to be a practical engineering problem instead of the classroom variety is attacked with a zeal that is surprising. There should be no fear that the personal activities of the engineers in charge of the laboratories would be infringed upon. It is not the idea to dictate work, but merely to make suggestions that might well be studied, thereby giving opportunity for a greater common interest.

There are problems of a general nature and of considerable importance which have had to wait while those of more momentary interest were disposed of. Some of these investigations have lapsed because no laboratory of a manufacturer could give the time to carry them through. With co-operation between the technical, commercial and private laboratories a committee should be able to direct the course of a general investigation so as to make it produce definite results and be of a great deal of benefit.

At its last meeting the Detroit Section of the S. A. E. passed a resolution to inquire into the availability of the United States Bureau of Standards for carrying on certain tests of a highly technical nature This was a definite expression that there is need for work that cannot well be carried on at the motor car factory. It also suggests the possibility of including the government departments in the plan of co-operation.

There are two further advantages that would arise if the S. A. E. took an official or semi-official interest in the technical schools. The first is in the matter of equipment. Manufacturers are constantly being requested to loan or donate motors and other modern equipment to the school laboratories. This is often at the request of some particular student, and when he has completed his course the investigation is not continued. Under the new plan the donor would have far greater assurance that the tests on the apparatus would be carried to the end intended and that a real benefit would result from his generosity. The second benefit would be the training gotten by the young men doing the work, for this would particularly prepare them for the motor industry.

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Berlin Prefers Electric Fire Engines

In reply to persistent declarations to the effect that the fire department of Berlin and adjacent metropolitan fire district contemplates to introduce gas-electric fire engines, Commissioner Reichel, who has all the development of fire apparatus for this important district completely in charge, makes the emphatic statement that propulsion by electric batteries for the city proper and by gasoline engines for the remoter districts, and for the vehicles used in the administrative work of the fire service, remains the approved system which has been found perfectly suitable. When the automobilization of the rolling stock began in 1906, twenty steam pumps were on hand and it was made obligatory to use them. They were mounted in the electric vehicles. In some instances the steam plants have worn out and have been replaced by gasoline engines driving rotary gear pumps of a construction developed by the department, which never found the centrifugal pumps satisfactory. In some instances a dynamo equipment has been added in order to utilize the gasoline motor better, but the pure electric propulsion system in these cases remains what it was. The fire engines propelled by gasoline engines are also equipped with rotary gear pumps. Summing up, the commissioner writes: "The Berlin fire service now possesses fifty automobiles and needs in all 145. If I did not test everything thoroughly and did not keep all strange influences energetically at a distance, I would, no doubt, by this time have in Berlin the largest museum of automobile fire-fighting equipment in the world. Smaller museums of this description have unfortunately already been collected in several places."—From *Der Mortorwagen*, June 10.

Harking Back a Decade

FROM *The Automobile and Motor Review*, July 5, 1902:

It has been demonstrated recently that a small private automobile stable can be built for about $300 with sufficient accommodations for a single small car. The tendency of the times is to use private automobile stables rather than to patronize the new-fangled garages or public automobile stations.

The Automobile Club of Great Britain and Ireland will put on a road test of pneumatic tires early in the Fall. The conditions call for a run of 3000 miles at 150 miles a day. Hostile observers will accompany each car as well as official observers. Alfred Harmsworth has offered cash prizes of $750. The competing tires will become the property of the club after the run and will be carefully examined. The set of tires that goes through the run under the conditions and appears to be in the best shape after its conclusion will be declared the winner.

The first machine which the H. H. Franklin Manufacturing Company of Syracuse put on the market was bought last week by a New York customer. It is a four-cylinder, air-cooled engine 3 1-4 by 3 1-4 inches and is capable of 15 miles an hour on high speed at 750 revolutions per minute. The extreme speed of the machine is reckoned at about 30 miles an hour. The transmission is by sun and planet gears inclosed in an oil-tight box.

William M. Lewis, president of the Wisconsin Wheel Works of Racine, Wis., announces that his company is perfecting engines which will be used in automobiles to be turned out by the company in January. It is stated that the new cars will be called Mitchell, from the middle name of Mr. Lewis.

The National Association of Automobile Manufacturers proposes to exhibit vehicles made by its members at the international automobile show which will be held in London next March. The association figures on securing a large space and proposes to ship the cars in a single consignment on both ocean trips.

The developments of the past week have shown that the Quaker City council is amenable to reason and as a result of the brake tests, control tests and other demonstrations of various types of automobiles, the proposed ordinance limiting motor speed to 5 miles an hour in Philadelphia has been amended out of all semblance to its original shape. The bill, as it will be presented for action, will probably divide the city into three sections, allowing a maximum speed of 15 miles an hour.

Alexander Winton in his new powerful racing car, The Bullet, set a new world's mark for a measured mile at 51 4-5 seconds. This is 3-5 seconds lower than Fournier's mark. The trial was not sanctioned and the A. A. A. probably will not recognize the record. Mr. Winton has declined to state what is the horsepower of the new machine.

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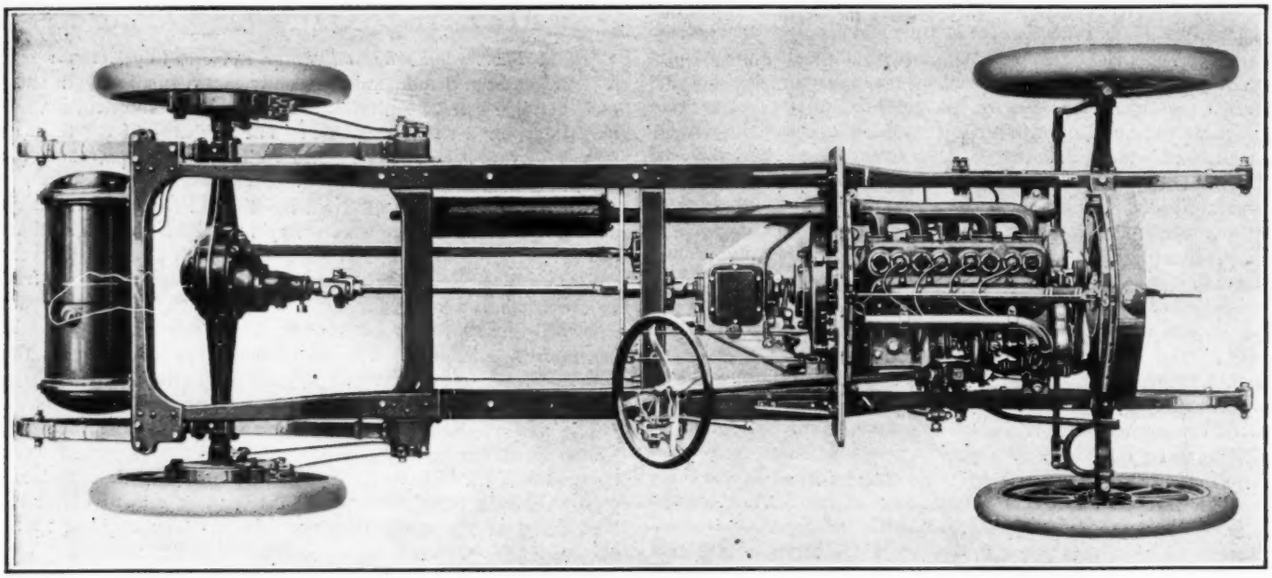
Small Truck to Oust Army Mule

MILWAUKEE, WIS., July 8—That the 3-ton truck will probably never be sufficiently utilitarian for army use, and that if the army mule is to be supplanted by the modern means of transportation, it will be the 1½-ton truck that will be utilized, are deductions gained by Capt. C. R. Williams, U. S. A., in charge of the exhaustive tests of motor trucks which have been going on since February, 1912.

Following the truck run from Washington, D. C., to Indianapolis during last spring, the manufacturers who made the best showing were invited to compete in a more severe test, under actual martial conditions, during the march of the middle western regiments of regular infantry, cavalry and artillery from Dubuque, Ia., to Sparta, Wis.

By the time the army reached Madison, Wis., 124 miles from Dubuque, Capt. Williams came to the conclusion that no truck with a capacity rating of more than 1½ tons would form a feasible means of army transportation. To quote Capt. Williams: "The heavy 3-ton truck has proven a failure for army use. The 1½-ton truck I predict will supplant the army mule."



Chassis of the new Hudson Model 37, showing new location of gasoline tank and drive features

Two New 1913 Hudsons

Model 37, the Four-Cylinder, Is Very Different from the Company's Product Last Year

Details Regarding the New Six-Cylinder Model Not Yet Made Public

THE coming season will see entirely new types of cars on the market under the Hudson name. These are to be two models, a four-cylinder and a six-cylinder type. The features of the new four-cylinder model, which is known as model 37, are in no way similar to those of model 33, which was the company's only type last year. Considerable speculation is in evidence as to the features of the six-cylinder car, the details of which are not yet made public.

The model 37, which is just out, has a new type of motor, the body design is distinctive and much more sweeping in its lines than that of its predecessor. The chassis is entirely new, the self-starting system is different, the location of the gasoline tank has been changed. In fact, it is an entirely new proposition except that the frame is the same as that of the 33 and the gear-box, gears and method of mounting the transmission as a part of the power plant are features which have not been changed.

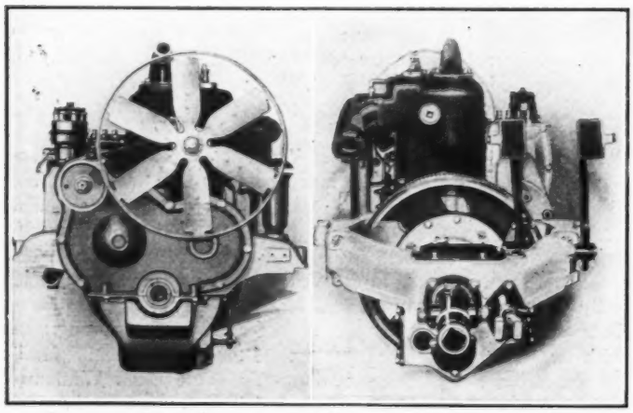


Fig. 2—Front and rear views of new four-cylinder Hudson motor

The motor of the new four-cylinder model is of the monoblock construction, the bore of the cylinders being 4⅛ inches and the stroke 5¼ inches. It has been designed to develop 37 horsepower at 1,500 revolutions per minute. Intake and exhaust manifolds are mounted on the same side of the motor as shown in Fig. 9. Either of these may be removed without in any way disturbing the other. The water outlet manifold WM is of large proportions, while there is a single connection with the cylinder casting for the vertical intake manifold IM, which is water-jacketed, the water being piped from the cylinder water jacket. As shown in the illustrations, the exhaust manifold EM connects individually with each cylinder, running parallel with the top of the motor up to the third connection, where it slopes downward to clear the floor of the car.

Valves Are Interchangeable

The valves are constructed to be interchangeable and are of nickel steel. They have a clear opening of 1¾ inches, this being possible on account of a diameter of 2 inches. The push rods are extra long and the springs are conically wound, the smaller diameters being at the bottoms, as shown at VS. The tappets P are of the mushroom pattern, being in contact with the cam faces at all times. They are provided with means for taking up at their upper ends in the form of nuts and lock-nuts. A casing having two large cover plates completely houses the valves, rods and tappets to the exclusion of dirt. This feature insures the proper lubrication of the bearings, as no dirt can get in to interfere with the effectiveness of the lubricant.

The pistons are of gray iron and have been made specially long in order to better distribute the side thrust between them and the cylinders and thus to reduce the wear on both to the minimum. With the idea of reducing motor vibration, the pistons are carefully balanced before being assembled in the motors.

Nickel steel studs secure the wrist pins WP in place, being made to have a press fit within the bosses to prevent shake. The studs are prevented from working loose by cotter pins. The wrist pin bearings are of hard phosphor bronze, 1 1-16 inches in diameter by 1⅞ inches in length, being pressed into the small ends of the connecting-rods.

As to the connecting-rods CR, they are of drop-forged, heat-treated alloy steel of I-beam section. At the crankshaft ends four nickel-steel bolts fitted with castellated nuts hold the bearing caps in place. In taking up the connecting-rod wear, thin shims

are used, and they are interposed between the caps and the rod ends.

A three-bearing crankshaft CS is used with this motor, this being a marked change from that of the former model 33, which was equipped with a two-bearing crankshaft The bearings are of bronze, lined with nickel babbit. The front bearing and the center bearing are each 2 inches in diameter, thee former being 2 9-16 inches in length, while the latter is 3 inches. These two bearings are seen at A_1 and A_2 in the sectional view of the motor. The rear bearing A_3 is the larger, having a diameter of 2¼ inches and a length of 3 15-16 inches. The connecting-rod bearings are 2 inches in diameter and have a length of 2⅝ inches.

Like the crankshaft, the camshaft S is mounted on three bearings of nickel babbit, the sizes being 2¼ inches in diameter by 2⅜ inches in length for the front bearing B_1, 2¼ inches by 1⅜ inches for the center bearing B_2 and 1⅞ inches by 1¼ inches for the rear bearing B_3. The camshaft has been made extra large in diameter to preclude any possibility of its deflection when lifting the valves. The cams are integral with the shaft, and, in addition to the eight which operate the valves, there are two cams which actuate the small horizontal oil pump and the air pressure pump.

Helically-cut steel timing gears are used, being mounted in the usual location at the front of the motor. Oil-tight cases fit over them and they run in oil to increase their silence and wearing qualities. Easy removal has been aimed at in their mounting, which is made a simple matter once the gear cover is taken off.

Flywheel Is Close to Bearing

The flywheel F is so designed that its weight is brought as close to the bearing as possible. This aids in reducing whipping stresses and relieves strain on the shaft. The rim overhangs the bearings completely, as will be evident from an inspection of the sectional drawing of the motor, Fig. 9.

The cooling system is made positive through the use of a large centrifugal pump located on the opposite side of the motor from the valves and on the motor-generator shaft. This pump may be removed by means of couplings at either side without in any way disturbing the other apparatus. This also applies to the packing of the stuffing-boxes. Reference to the illustration brings out the peculiar mounting of the shaft on two bearings, one at either side of the pump and each made integral with the upper half of the crankcase. Due to the monoblock casting, there is only one inlet water manifold connection with the cylinders, the waterjacket space being a unit around all four cylinders. The jacket space has been made ¾-inch wide all around, and, with its very wide type of water outlet manifold, the motor is designed for free water circulation. The cooling fan is belt-driven from a pulley mounted on the end of the pump and motor-generator shaft.

A constant level splash lubrication system is employed for

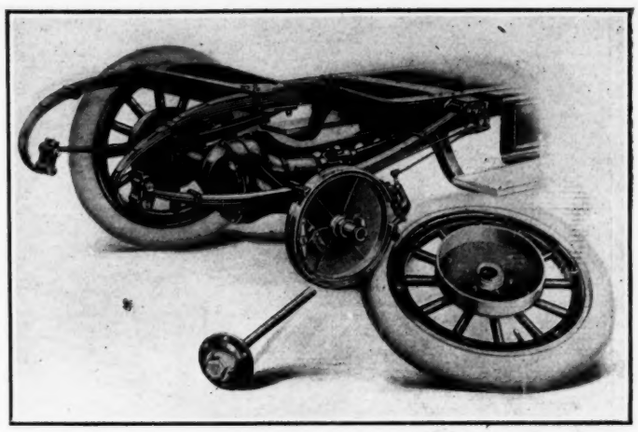


Fig. 3—Rear system of Hudson 37, showing springs and brakes

lubricating the connecting-rod bearings, wrist-pin bearings, camshaft bearings, and so on. The front and rear main bearings are positively lubricated by means of the plunger oil pump already mentioned. This pump is operated by a cam mounted on the camshaft and it has a horizontal stroke. There is a sub-bottom to the crankcase where the oil is first led. Four troughs LT hold the oil into which the ends of the connecting-rods dip, and the overflow from these troughs runs down into the bottom of the crankcase, which slopes downward to the center. A sump here collects the lubricant, and it is pumped from here through OP back to the main bearings by the oil pump. The breather pipe and oil-filler pipe are combined and placed over the left front mounting of the motor. There is an inner wall to this pipe through which the oil enters, while the space between this and the outer shell forms the air outlet or breather. Inspection of the sectional view reveals the large oil holes for lubricating the bearings. Two holes G_1 are provided in the front bearing of the crankshaft, two J_1 in the center bearing and one H_1 in the rear main bearing. The pipe connection to the latter is seen in the figure at H_2. The piping from here to the pump and also from the front bearing to it is clearly seen in the halftone illustration of the left side of the motor. For lubricating the lower bearings of the connecting-rods, the holes R are drilled into the centers of the rod ends from the sides of the rods. Some of the oil which is splashed from the troughs LT enters the bearings through these holes. The oil, before entering any of the motor parts, is strained to exclude any foreign matter. A pressure gauge on the dash indicates whether or not the oil is circulating properly.

The motor is fitted with a Zenith carbureter, which is designed for factory adjustment once and for all. To facilitate starting in cold weather, the carbureter is fitted with a dash strangler

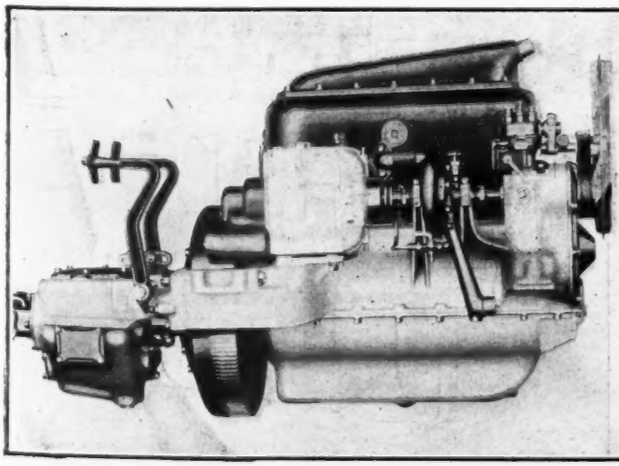


Fig. 4—Right side of motor used in the Hudson Model 37 to be marketed this year

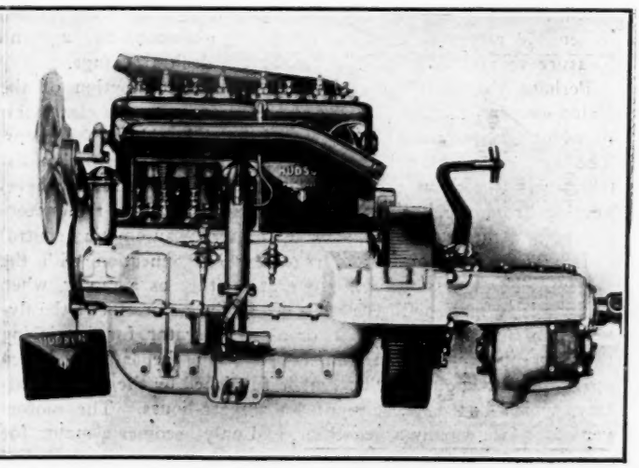


Fig. 5—Left side of the motor

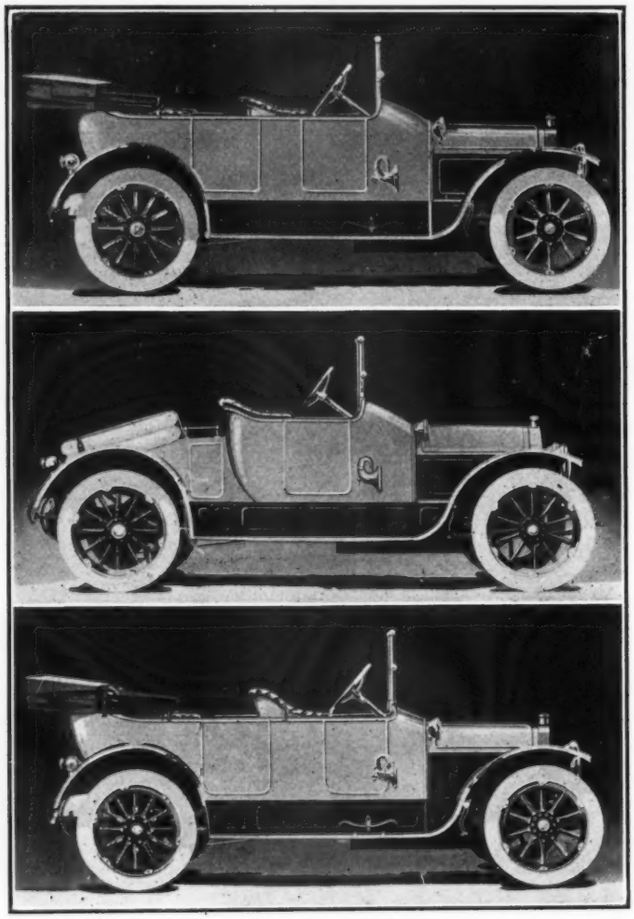


Fig. 6.—Torpedo, roadster and touring bodies to be furnished as regular equipment

which causes an extra-rich mixture to be sent to the cylinders. By means of the air-pressure pump the gasoline is fed to the carbureter under a 2-pound pressure from the gasoline tank, which is located at the rear of the machine under the frame, a new departure for the Hudson concern and one which is rapidly gaining in favor with American manufacturers and users of cars. Two substantial leather-lined brackets hold the tank in place. It has a capacity of 22 gallons and is of cylindrical shape made of heavy-gauge pressed steel. At one end of the tank a gauge is mounted which indicates at all times the amount of fuel in the tank. If necessary to drain the gasoline for any reason, the plug fitted at the bottom of the tank may be pressed into service. When the motor is running, the pump maintains the 2-pound pressure very closely, as indicated by the dash air gauge.

Perhaps the most radical change is in the adoption of the Delco electric starting, lighting and ignition system, a clear view of which is seen in the illustration of the right side of the motor. The motor-generator is mounted to the rear, while the distributer is located at the front, its shaft being driven by bevel gearing from the horizontal shaft. In addition to the motor-generator, there are a storage battery, automatic control switches, cut-out device and regulator in connection with the system. The motor-generator operates either as a motor, when its gear is in mesh with the teeth cut in the outer rim of the flywheel to turn the crankshaft, or as a generator for furnishing the current for ignition and for lighting the lamps. When operating as a motor, the current is furnished by the storage battery, which has a capacity of 80 ampere-hours. The motor-generator is normally a generator, and only becomes a motor for starting. In starting, the driver pushes a button on the dash and presses the clutch pedal forward. This sends current from the battery to the motor and at the same time meshes the flywheel teeth with the motor gear. As soon as this turning over of the engine causes fuel charges to be drawn into the cylinders the motor starts to run on its own power and the operator releases the button. The generator then takes up the work of supplying the ignition current and of charging the battery to its capacity. When the latter reaches this state, it floats on the line and is ready for use in driving the motor. The system furnishes dual ignition, with magneto type of spark for ordinary running and the battery ignition in cases of emergency. A kick switch on the dash controls the operation of either source of current. The lamps may be operated either from the generator direct or through the storage battery. A three-key light switch is placed on the dash for sending the current to the lamps, and a special feature is the placing of a small lamp on the dash for reading of gauges at night. This lamp is in circuit with the rear lamp, and, if the small dash lamp goes out, it is an indication that the other lamp is also out of order. An extension lamp is furnished which can be attached to any of the regular lamp sockets.

Clutch Is of Noiseless Disk Type

The clutch is of a noiseless disk type, self-contained in an oiltight case which is a part of the flywheel. The disks are steel stampings ground 8 11-16 inches in diameter. There are eight disks, which have cork inserts, on the driving member. The driven disks are seven in number and are of plain steel. The idea of the corks is to insure a soft and smooth clutch engagement and to eliminate jerks and slippage in getting under load. The clutch spring is located in a hole bored in the end of the crankshaft. A ball-thrust bearing transmits the pressure to the clutch drums. Small springs are placed between disks to insure their separation when the clutch is released. A half-and-half mixture of oil and kerosene lubricates the arrangement and serves to prevent grabbing and to aid in free action. Lubricant is added through a plugged hole in the casing, which may also be used for cleaning the clutch.

The transmission is the same as that used on the previous model 33. It is of the three-speed selective type, with direct drive on third. A V-shaped member bolts to the rear of the motor, making a unit power plant construction and carrying the transmission gears. Gears are of large size, have strong teeth and wide faces and are mounted in malleable iron cages which prevent them from working loose in the aluminum case. Roller bearings are used throughout the transmission and the gears and bearings are kept running in oil.

Power is transmitted from the transmission to the rear axle through a propeller shaft of nickel steel and two universal

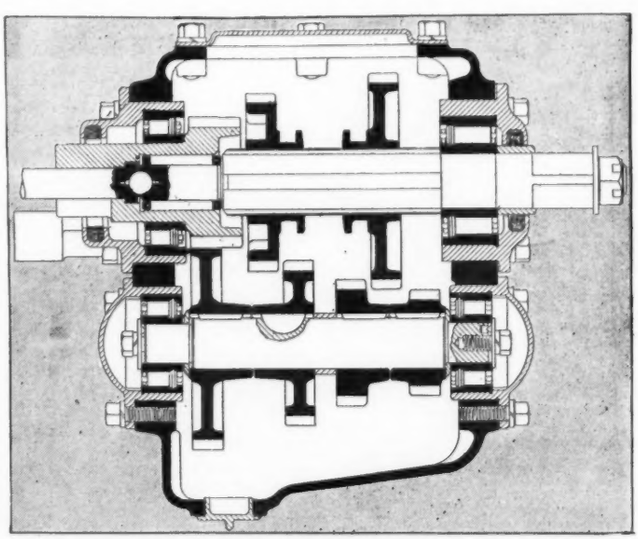


Fig. 7—Plan view of the Hudson gearset

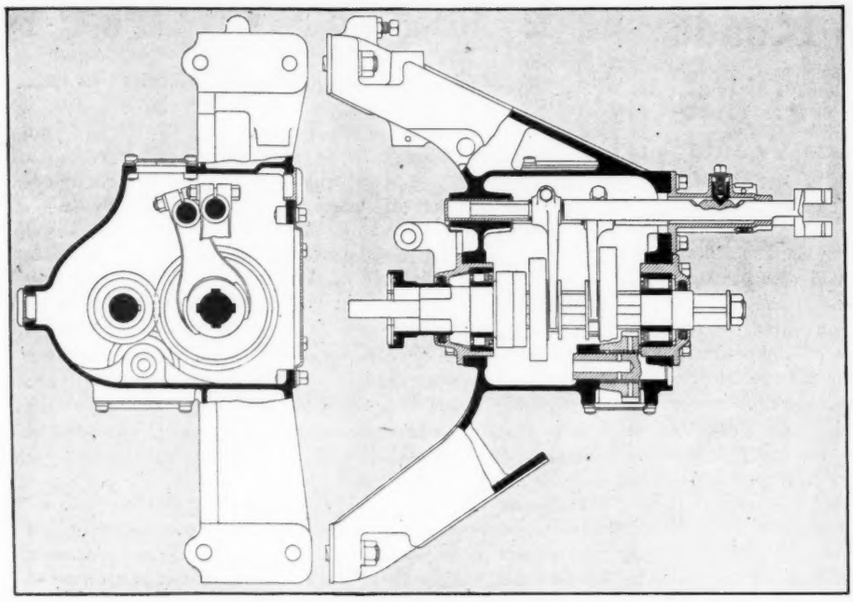


Fig. 8—Transmission and frame used on the new four-cylinder Hudson

joints. The sliding shaft, squared for the universal joint mountings, has a width of 1 3-8 inches across the face and is 5 1-2 inches long.

Specially Strong Front Axle

The front axle is an alloy steel, one-piece rock forging, heat-treated. It is an I-beam section and at its smallest point measures 2 3-8 inches in height and has a depth of 1 1-2 inches. The pressed steel rear axle is of the floating type made by the Bower Company, the two halves being welded together and bolted for extra strength. Driving gears and differential are mounted as one unit, which is bolted to the axle and easily removable without taking the whole axle down. The construction of this unit is such as to allow the adjustment of pinion and driving gear without interfering with the other parts. The pinion and differential case are mounted on large roller and thrust bearings, and the whole runs continuously in a bath of oil. Driving shafts are constructed of nickel steel, oil-treated and due to the floating construction may be removed without disturbing any other parts of the axle. The driving pinion is made of hardened nickel steel and the crown gear is of a specially hardened alloy steel of large section. The plate on the back of the axle may be removed for inspection or adjustment of the differential part. Each end of the axle carries two roller bearings on which the wheels are mounted.

Another departure from former Hudson four-cylinder automobile design is in the use of a substantial torsion arm which runs from the front cross-member of the frame, on which it is mounted in a double spring buffer, to the rear, where it fastens to the axle, as shown in Fig. 1, instead of the torque tube construction in which the propeller shaft was completely inclosed.

The brakes are of the usual double type mounted on the rear wheels. They are 14 inches in diameter and have a 2-inch face. Foot brakes are external contracting, emergency brakes internal expanding. Brakes are lined with special non-burnable lining fastened to the brake bands with copper rivets. The brake drums are pressed steel of one piece type, bolted to the wheels with twelve bolts.

Side frame members are of one piece pressed steel, heat-treated. They are of channel section, 4 inches high, 3 1-4 inches deep and 5-32 inch thick. These members are narrowed in front to give a smaller turning radius. A drop of 4 1-2 inches is made on the rear of the frame in order to secure a lower center of gravity for the whole chassis. There are three cross-members, one at the center of the frame, one half-way back, to which the front shackles of the springs are fastened, and the rear member, which extends out to receive the spring ends.

The springs are made flexible by the use of a large number of thin leaves, which are tongued and grooved to prevent side motion, in addition to which leaf retainers are used. Phosphor-bronze bushings are provided in all spring eyes and the shackles are drop-forged and machined to size. Grease -cups are provided to lubricate the spring bushing. The front springs are semi-elliptic, have a length of 37 inches and a width of 2 inches, while the rear springs are of three-quarter elliptic type and are 50 inches long by 2 inches wide.

The wheels are of the artillery type, the spokes being 1½ inches in diameter, and constructed of second-growth hickory. In the front wheels 10 spokes are used, with a corresponding

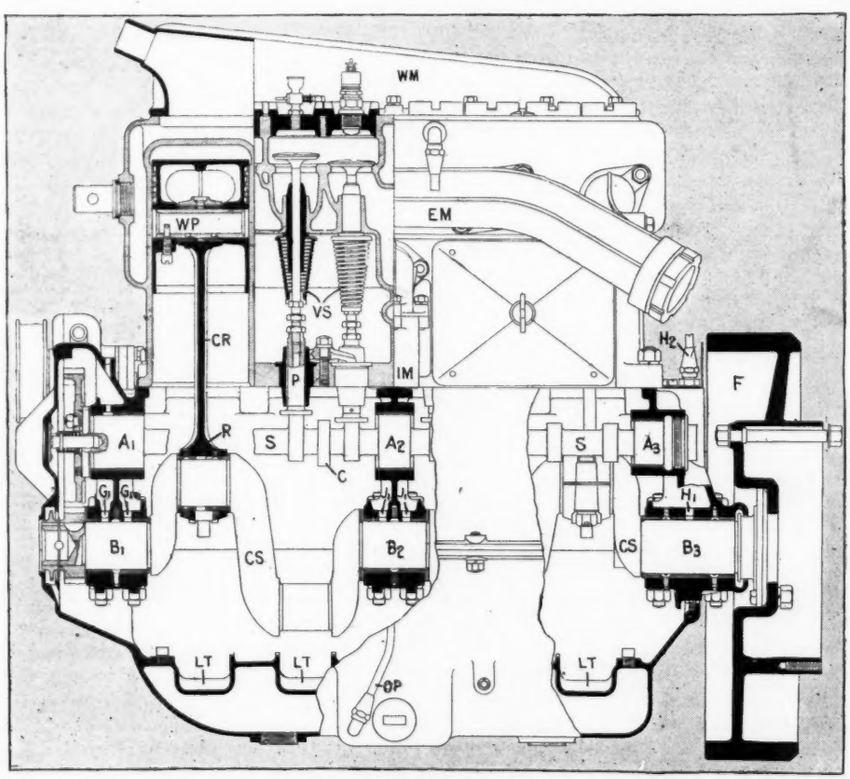


Fig. 9—Sectional diagram of the new four-cylinder Hudson motor

Says We Have No Roads

Lord Montagu Thinks That with Suitable Highways Foreign Tourists Would Flock to This Country

LORD MONTAGU of Beaulieu, editor of the English motoring publication *The Car* and one of the men who has done much toward bringing the automobile into general use in England, has just returned to New York after an extensive trip through the motor car manufacturing centers of this country. When a foreign expert comes to our shores for the special purpose of studying us we can be sure that the searchlight is turned on our tenderest spots; our weaknesses stand out prominently against the background of our successes and an unequaled chance of seeing ourselves as others see us is offered if we but make use of the rays of this same searchlight.

When the staff man of THE AUTOMOBILE saw our distinguished visitor in his apartment at the Ritz-Carlton shortly after his arrival from the middle West, where he had made a critical tour of our largest factories, Lord Montagu had formed concrete opinions regarding the status of the industry in this country. In response to a question regarding the impressions gathered during his stay in this country, his reply showed amply that in his opinion the manufacturing industry had far outstripped an industry which should have kept pace with it; that is, the art of road-building.

"Just think," said Lord Montagu, "here in America you have three-quarters of a million cars and next year you will have a million, and yet you have no roads to run them upon. Not that you do not spend enough money; your appropriations are on a generous scale; still you put all the money in building the roads and hardly any in keeping them up. There seems to be no legislative method of obtaining money to maintain the roads after they are built. I know nothing whatever about your politics, but I do think that your future President, whoever he may be, should heartily endorse a nation-wide good roads campaign. In our country the roads were built before the motor car; in many instances these come down from the early Romans. Our whole road system has gradually developed and we have a regular maintenance tax laid upon the road users. Your roads have come after the automobile and you eat up your appropriations in building, but there is no system by which you tax those who use the road, in order to maintain it.

"Why, if you had good roads throughout the country, tens of thousands of foreign tourists would gladly pay a tax of say a dollar for each 50 miles to come to the United States and view its wonderful scenery. This would mean an enormous inflow of foreign money into the country. The customs house could make arrangements with tourists who intended taking their cars out again so that there would be little expense in that direction. Now these tourists are kept away by the roads. The best roads I have seen during the time I have spent in traveling about the country have been in the vicinity of New York, Boston and Washington. Throughout the middle West the roads are nearly all dirt and are in extremely bad condition.

"Regarding the motor car industry itself, needless to say it is tremendous; it is growing so fast that it is impossible to tell where we will end. In the cheaper cars especially the manufacturing business is tremendous, as is shown by the great number of your lower-priced cars which are sold in England. We have not done much in the cheap car way, but so far have left that for you to do.

"The use of the car in England is different from what it is in the United States. You use your cars mostly for pleasure driving; we have outgrown that. Our business men use their cars to come to the office. We use them in place of the trains. In our own office there are gentlemen who come from their homes, 40 miles from town, daily in their cars. America has not reached the stage yet where automobiles are used on a large scale for purposes of utility; here they are used nearly entirely for pleasure purposes."

Lord Montagu will leave New York on July 16, having booked passage on the Lusitania.

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number of hub-clamping bolts. The number of spokes and bolts is increased to 12 in the rear wheels. All wheels are fitted with 36 by 4-inch demountable rims.

Steering is accomplished through a worm and worm gear combination of the irreversible type. The worm gear is integral with the shaft and is of the full gear type, the design being carried out in this way in order to provide an adjustment in case of wear.

Control features are standard, the throttle and spark levers being mounted on a sector on top of the steering wheel as in the usual design. The control is right-hand, the levers being placed at the driver's right inside the body. Clutch and service brakes are adjustable and are found in the usual positions. The steering wheel has a diameter of 18 inches.

As to the standard equipment, this consists of the starting-lighting-ignition system already described, full complement of lights, 12-inch upholstery, speedometer, magnetic gasoline gauge, demountable rims with extra rim and tire holder, 36 by 4-inch tires, windshield, mohair top and curtains, top cover, license-carrier and full set of tools.

The standard body types are the torpedo, touring car and roadster designs. These are all new and distinctively cleancut in appearance. The cowl and dash are made in one piece of sheet metal, no wood being used. The roadster in particular is of pleasing design and is fitted with doors of large size. A new feature is the rear compartment, which is also fitted with two small side doors and through which a suitcase may be slipped, the inner compartment being large enough to accommodate two. Tire brackets are placed on top of this compartment, and, in addition to the tires, a tire trunk may be carried. There is also a door in this part which provides space for the tools, tire chains and so on. In the roadster and torpedo models tire brackets are provided for carrying extras at the driver's right, while the only other apparatus which is carried on the running board is the storage battery of the electric system.

Other body types, such as limousines and coupés, are furnished by the makers on special orders.

The price on the three standard models has been fixed at $1,875, a slight increase over the prices placed on the model of last season.

Delay Buying Licenses Pending Test

JACKSON, MISS., July 9—Much public opposition has developed to the automobile license tax imposed by the last legislature. Thus far only 207 machines have been registered and it appears that the majority of owners will wait until the new law is tested. The state's attorney announces that prosecutions will begin promptly after August 1, when it is provided that all taxes must be paid.

Advocating Good Roads in Ohio

COLUMBUS, O., July 8—The Ohio State Highway Commission and the Ohio Good Roads Federation have started a 3-months' campaign in the interest of good roads building in Ohio. The primary object of the campaign will be to influence the voters of the State in adopting the provision of the Ohio Constitutional Convention of issuing $50,000,000 bonds for road improvement in the Buckeye State. The matter will be voted upon at a special election to be held September 3.

If the proposition is carried the money is to be used to carry out the state-wide plan of road improvement and will be expended under the direction of the highway commissioner. None will go except for the improvement of what is known as main traveled roads from one center of population to another. Later roads leading into the main thoroughfares will be improved under the direction of county commissioners, and it is expected to have all of the highways in the Buckeye State improved within a very few years.

Friends of the movement assert that there is no commercial proposition of greater importance at the present time than the improvement of wagon roads. It is estimated that 75 per cent. of the commerce of the United States starts over the public highways of the country. The average American farm is 10 miles from a railway, although in Ohio the distance is less.

Boom Trunk Road Across Alabama

SELMA, ALA., July 9.—After more than a year's work motor car owners in this city and vicinity feel that they are assured a model road which will span the state from Georgia to the Mississippi lines. Thursday a meeting of all those interested will be held in Demopolis for the purpose of forming the Selma-to-Mississippi Highway Association. The road is to start on the Alabama side of the river just opposite Columbus, Ga., and will extend through Montgomery, Selma, Uniontown, Faunsdale, Demopolis and on to the Mississippi line near Meridian. Missionary work has been done along the whole line of the road during the past year and there is no question but that, when put to a vote, the building of the road will be authorized. The object of the association will be to aid the work done by the counties financially and in other ways.

T. C. A.'s Canadian Frontier Branch

The Touring Club of America has established at Niagara Falls, N. Y., the Niagara Frontier Branch, under the direction of Howard O. Babcock, a prominent and well-known automobilist of that city.

The Touring Club officials decided to locate a touring bureau at this point, owing to its splendid geographical location, and especially for the convenience of motorists touring from the United States into Canada.

Automobilists will find always available at the Niagara Frontier Branch, in the International Hotel, bulletins giving the latest information, not only of road conditions in New York, Ohio and Pennsylvania, but of the main travelled highways in the Dominion.

Motorists in the United States contemplating touring in Canada can receive valuable assistance from Manager Babcock of the Niagara Frontier Branch in securing through the Customs House bonds, permits and licenses which will facilitate their entering the Dominion.

Still After Illegal Tag Users

HARRISBURG, PA., July 8—The crusade made by the state highway department in forcing the automobile dealers of the Keystone State to observe the law governing the use of the dealers' tag is being continued. The fault found is that few, if any, of the men selling cars use any other than the tag that can be used under the law for demonstrating the car to a possible purchaser.

Another point which the highway department is about to enforce is the wearing of the drivers' personal registration pin. These pins have been secured by every dealer, but it is claimed that the section of the law prohibiting the chauffeur from running a car without the pin prominently displayed is a dead letter.

Alco Truck Acts as Pathfinder

KEYSTONE, IA., July 6—The transcontinental Alco assumed the rôle of pathfinder today when the crew in charge agreed upon request from Denver Board of Trade transcontinental route boomers to supply information on roads and bridge conditions. A delegation of tourists from Denver are on their way West, following in the path of the big motor truck.

Iowa bridges have been found woefully weak. The truck fell through a bridge near this city, the second in three days. It was jacked up and pulled through under its own power. Sentiment is strong along the Iowa route for better bridge facilities. The vehicle fell through a bridge 11 miles west of Clinton, dropping 6 feet to the bed of the creek. The crew jacked it up on boxes of soap which makes up the cargo. A runway was built with more boxes and the truck reached the other end of the bridge easily. A group of farmers notified the crew that they had been agitating for a new bridge for some time.

Aside from this incident considerable work was required in replanking and bracing other bridges. A few required block and tackle to keep them secure.

Pope-Hartford Stars at Davenport

DAVENPORT, IA., July 6—The annual hill climb of the Davenport Automobile Club took place on the morning of the Fourth, being witnessed by several thousand spectators, although started at 7 o'clock in order not to conflict with the races of the Mississippi Valley Power Boat Association. There were eight events. The Pope-Hartford carried off the honors of the day, winning four firsts, a second, third and establishing the best time of the day for the steep climb of four blocks, 18 seconds flat. The Cadillac made the next best record with three firsts and a second.

Calendar of Coming Events

What the Months Ahead Have in Store for the Automobilist—Shows, Conventions, Race Meets, Etc.

Shows, Conventions, Etc.

July 10-20.....Winnipeg, Man., Canadian Industrial Exhibition.
July 22-27.....Detroit, Mich., Cadillaqua Week.
Aug. 5-7.....San Francisco, Cal., Pacific Highway Convention.
Sept. 17-20.....Denver, Col., Convention International Association of Fire Engineers.
Sept. 23-Oct. 3....New York City, Rubber Show, Grand Central Palace.
Dec. 7-22.....Paris, France, Paris Automobile Show, Grand Palais.
Jan. 4-11, 1913....New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
Jan. 4-11.....Cleveland, O., Annual Automobile Show.
Jan. 20-25.....Philadelphia, Pa., Annual Automobile Show.
Jan. 27-Feb. 1.....Detroit, Mich., Annual Automobile Show.
Feb. 1-8.....Chicago, Ill., Annual Automobile Show.
Feb. 10-15.....Minneapolis, Minn., Annual Automobile Show.
Feb. 17-22.....Kansas City, Kan., Annual Automobile Show.
Feb. 24-March 1.. St. Louis, Mo., Annual Automobile Show.
March 3-8.....Pittsburgh, Pa., Annual Automobile Show.
March 8-15.....Boston, Mass., Annual Automobile Show.
March 17-22.....Buffalo, N. Y., Annual Automobile Show.
March 19-23.....Boston, Mass., Annual Truck Show.
March 24-29.....Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

July 15.....Milwaukee, Wis., Reliability Run, Wisconsin State Automobile Association.
July 15-18.....Cleveland, O., Reliability Run, *The Cleveland News.*
July 21.....St. Louis, Mo., Track Meet.
July 22.....Dallas, Tex., Farm and Ranch Tour, Dallas Automobile Club.
Aug. 8-10.....Galveston, Tex., Beach Meet.
Sept. 17.....Milwaukee, Wis., Grand Prize Race.
Sept. 20.....Milwaukee, Wis., Wisconsin Challenge and Pabst Trophy Races.
Sept. 21.....Milwaukee, Wis., Vanderbilt Cup Race.
Sept. .....Chicago, Ill., Commercial Vehicle Reliability Run, Chicago Motor Club.
Sept. .....Washington, D. C., Reliability Run, Automobile Club of Washington.
Sept. .....St. Louis, Mo., Track Races, Universal Exposition Company.
Oct. 7-11.....Chicago, Ill., Reliability Run, Chicago Motor Club.
Oct. 12.....Salem, N. H., Track Meet, Rockingham Park.
Nov. 6.....Shreveport, La., Track Meet, Shreveport Automobile Club.

Foreign

Sept 26-Oct. 6.....Bourges, France, Agricultural Motor Car Exposition.
Nov. 8-16.....London, England, Olympia Automobile Show.
Jan. 11-22.....Brussels, Belgium, Annual Belgian Automobile Show. Centenary Palace.

THE AUTOMOBILE

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The Engineering Balance Wheel

WHETHER the mature judgment of the conservative engineer or the snap judgment of the masses shall determine the features of design in the new models is a question which the board of managers of not a few factories have not possessed enough stamina to sanely adjust. They have wavered. Their corps of consulting engineers planned a well-balanced chassis, a mechanical creation worked up into a symmetry of efficiency; a resultant in which each part was proportioned with regard to its perspective in the final picture; they completed it, they tested it and found it efficient, equal to the demands and more. Then came the crucial moment: The selling representatives from the four corners of the land met to lift the veil, to analyze the new car, to see it with the eyes of him who meets the public face to face, and with the eyes of him who has to market the product and satisfy the consumer.

They saw and were not content. They objected to the body lines; the convex line must be changed to a straight one, and the concave to a convex. The public would not buy anything else; all selling effort would be increased five-fold if such alterations were not made. The engineer heard and obeyed. It was his to design to sell and not design to drift the company into the shoals or onto the rocks. The public had its way.

A year passed by. Once more the engineering corps fashioned their product, scaling it in accordance with the engineering formulæ and moulding it in harmony with the best accepted practices. But once more the dealer calipered the product through the eyes of the public and once more engineering worth was set aside and public demand pedestaled.

This vacillating program has been going on for several years; each season sees sane engineering dethroned and public taste enthroned, and each succeeding year witnesses the discarding of the public whim of yesterday and the adoption of the engineering fact of the day before. So it continues, not with one firm but with a hundred, every one terrified as to what the public will say. Will they buy or leave it?

Many concerns have experienced this nightmare for several seasons, particularly since the early announcement of models which has resulted in the setting of certain automobile fashions which the makers must make at least a pretense of following. A brief survey shows that the public demands are often wrong; used this year only to be discarded tomorrow; adopted today for a little glittering tinsel and discarded tomorrow because of absolute inefficiency.

This has taken place this year, it has taken place within the last 6 months and it will take place again. It assumes hundreds of different forms. With one maker it is wheels. He has found that a certain diameter of wheel is best suited for his chassis. He has tested it out with such and found it correct. With a larger or smaller wheel the performance of the machine is entirely different, far from being so good. But when the factory aims meet those of the selling force, the engineer has to give way, the other size is put on and the car starts out on its career badly handicapped, just because the dealer imagines that the public wants it.

There must be a line drawn, a line on one side of which the engineering requirements of the designers are placed and on the other side the wishes of the public. At present many factories have never drawn such a line. They will give almost anything to sell and give a different anything each succeeding year. Selling is their only goal. On the other hand, there are those who have stood solid on the rock of engineering practice, and, although they were lagging at times when gauged by public pulse, yet the passage of 4 or 5 years invariably has found them in the lead.

There are too many concerns which are afraid to draw the line. They have not enough confidence to take the step. They hang onto the old, because it has suited the public, until without warning this fickle public casts it aside. The strong concern is the one that decides what is right and then goes ahead, determined not to be led by the public but to make the public think its way. More of such are wanted.

There is a right and a wrong in engineering and the right cannot be followed continuously because the public constitutes the other half of the equation. One construction may be better in the hands of the public than another, at which time it is business acumen to give way to conditions for a time, only as a stepping-stone to the eventual. But where a company is constantly turning east, west, north and south only to take an about-face turn the next season, an engineering balance wheel is needed. The strongest concerns today are those that get things right from an engineering point of view and then start out to convince the public. They continue their warfare until they convince the public. With some, they were not all right, and they generously gave away, not

afraid to acknowledge their errors. Others have proved too obstinate, slaves to their own whims, and it is rarely that a whim does not rise to the surface although its period of attention may be very brief.

Not a few concerns lack that business stamina necessary to go out to convince the public. They are afraid others will reap an immediate advantage and they see the rewards of today rather than the cumulative profits of the year. Instead of convincing their dealers, they let their dealers convince them. Instead of progressing, they are merely vacillating. Instead of educating the public, they are merely letting them play the ostrich rôle.

Big Registration in Bay State

Figures for the Past 6 Months Show that Receipts Are Already $110,667.25 Ahead of Last Year—Many New Commercials

BOSTON, July 6.—From the figures just compiled by Edward J. O'Hara, who has charge of the automobile department of the Massachusetts Highway Commission, further evidence is given of the importance and growth of the motor industry in the Bay State.

Although but 6 months have passed the total receipts have run $110,667.25 above the same period for 1911. Not only that but the entire year of 1911 is bettered by $9,039.22. And there are still some heavy registrations to come for many of the summer residents will help swell the total between now and August.

Last year there were 38,907 cars registered. Up to July 1 last there were 40,833. As a lot of men are still waiting for their machines, some of the factories being somewhat behind, the total registrations will go much higher.

The increase has been general along the line, too. For example last year there were registered 3658 motorcycles. Up to date there have been 3759 such machines registered. The manufacturers and dealers have increased also, for there were but 870 named throughout 1911 while there are now 1027, an increase of 157. New concerns are being formed every week, so the figures will increase.

That there has been a steady growth in the number of commercial vehicles sold throughout the state is shown by the figures for these. In 1911 there were about 2000 trucks registered. This year a distinct tabulation is kept on these vehicles and up to July 1 there had been registered 3100 such vehicles.

This shows a gain of about 35 per cent. That there would be more sold if there had not been the agitation to keep such vehicles off the road by hostile legislation, but which fortunately did not pass this year, is the opinion of some dealers. Some of the men who now own trucks have said that until reassured that commercial vehicles would not be legislated off the road they would not invest in more equipment.

In the number registered this year are many old cars that have been turned into delivery wagons. They come under the truck rating. But not being built originally for the heavy truck work they will last but a year or two under the hard service and so they will be displaced by real trucks.

With the state receiving $513,201.67 to date and considering what will be received from fines this year in addition to the total from motor trucks it is estimated that the receipts this year will easily go over $550,000 and they may even reach as high as $600,000.

The following table shows the increase in the motor industry in the Bay State, during the past year:

	Year 1911	To July 1, 1911	To July 1, 1912
Automobiles	38,907	32,212	40,833
Motorcycles	3,658	2,854	3,759
Manufacturers or dealers	870	783	1,027
Operators	11,061	6,370	7,939
Operator renewals	25,345	21,079	24,388
Chauffeurs	4,183	2,241	2,702
Chauffeur renewals	11,361	7,157	7,771
Examinations	6,137	3,321	3,736
Commercial vehicles	*2,000	*1,500	3,100
Total fees	$504,162.45	$402,524.42	$513,201.67

*Approximately.

New Roads in Yellowstone Park

Heyburn, of Idaho, Introduces Amendment to Sundry Civil Bills Asking for Appropriation of $250,000 for the Purpose

WASHINGTON, D. C., July 8—Senator Heyburn, of Idaho, following the introduction of a resolution calling for an estimate of the cost of construction of new roads, or changes in the present roads, in the Yellowstone National Park, in order to permit the use of automobiles and motorcycles therein, without interfering with the present mode of travel in vehicles drawn by horses or other animals, followed it up with an amendment to the sundry civil bill calling for the appropriation of $250,000 with which to make the suggested changes.

So far the estimate asked for from the Secretary of War has not been submitted, but it is expected that it will be in time to be used as an argument in favor of Senator Heyburn's amendment. At present the use of automobiles in the Yellowstone Park is seriously interfered with, due to the restrictions placed on the practice. In addition, there is danger to the drivers of horses or mules when the latter meet motor vehicles on some of the narrow roadways.

Senator Heyburn thinks the Yellowstone Park is destined to be one of the most interesting of spots for motorists and, while he would extend this use of it, he is anxious to protect other travelers.

Senator Jones, of Washington, has also introduced an amendment to the sundry civil bill under which the sum of $35,000 is appropriated for the improvement of the government road between the National Park Inn, in the Mount Rainier National Park, and the point where the government road leaves the national forest reserve.

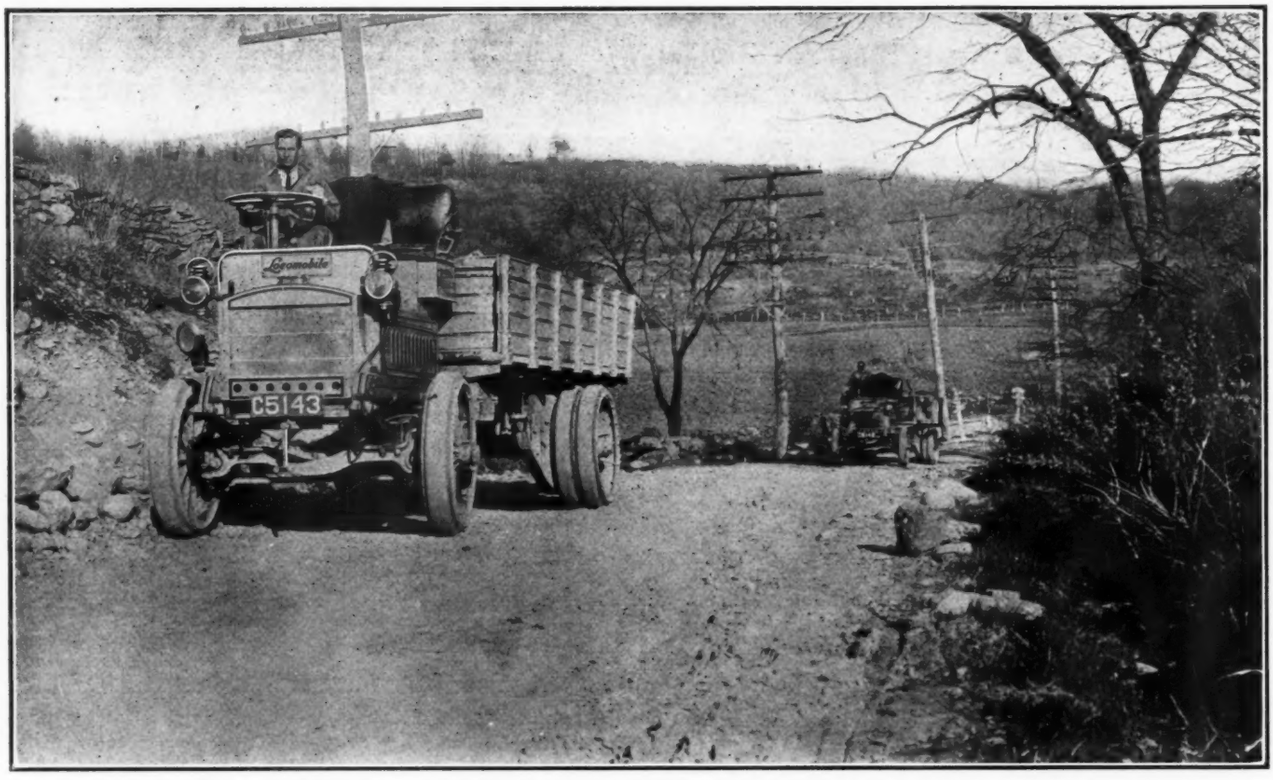
Wisconsin Gains 3,000 Registrations

MADISON, WIS., July 8—On July 1, 1912, 21,416 licenses for motor cars had been issued by the secretary of state of Wisconsin, an increase of more than 3,000 over the corresponding period a year ago. In addition, there have been issued 4,100 motorcycle licenses and 972 dealers have been registered. Private owners and dealers pay $5 per year and motorcycles $2 annually, making total receipts by the state of $120,000. After paying the expenses of maintaining the registration bureau, the secretary of state turns the residue into the state highway fund. It is calculated that nearly $100,000 will be raised for highway purposes each year in Wisconsin under the new state aid law, which appropriates $300,000 for the building of highways.

Pennsylvania's Big Registration

HARRISBURG, PA., July 8—The $500,000 mark was reached several weeks ago by the state highway department in licenses and registration fees for automobiles, motorcycles and chauffeurs when the registrar issued license No. 50,000. The record for less than half a year breaks all past registration.

The money is not available for the improvement and maintenance of state highways, but at the next session of the Legislature a bill will be introduced specifically providing that this money and other similar fees can be used for road purposes. There is also $1,000,000 in the fund from past years.



5-ton Locomobile truck used by Bridgeport Hydraulic Company in constructing dam. Note the hilly country covered

LUNCHEON for Batchelder—A representative committee of Seattle automobilists gathered at luncheon recently in honor of A. G. Batchelder, chairman of the executive committee of the A. A. A. In the company were Judge J. T. Ronald, president of the Pacific Highways Association; Judge Richard A. Ballinger, Judge Alfred Battle, C. E. Plimpton, president of the Automobile Club of Seattle; Joseph Blethen, W. A. Avery, Frank M. Fretwell, R. P. Rice and George Bentel, of San Francisco.

Philadelphia has Motz Branch—A Philadelphia branch of the Motz Tire & Rubber Company, in charge of William M. Shibbs, has been established at 1409 Race street.

Moore Nyberg's Assistant Manager—W. E. Moore has been promoted to assistant general manager of the Nyberg Automobile Works, Anderson, Ind. His position as production manager will be filled by Otto Schultz.

Whiting has Philadelphia Agency—The Philadelphia branch of the Mercer Automobile Company has been absorbed by the Whiting Motor Company, of New York, which will hereafter have the agency for Pennsylvania, Delaware and Maryland.

Willys at North Shore—President John N. Willys, of the Overland-Garford-Gramm companies, has opened his summer home on the north shore of Massachusetts near President Taft's cottage, and he will spend as much time as possible there.

Studebaker Branch in San Antonio—C. W. Hartman, manager for the Studebaker Company in Texas, with headquarters in Dallas, announces the opening of a branch house in San Antonio. This is done with a view of handling the south Texas trade.

C. H. Washburn Dies—Charles H. Washburn, for 35 years associated with the Mitchell-Lewis Motor Company, Racine, Wis., died on July 5, aged 61 years. Mr. Washburn was prominently identified with the evolution of the present Mitchell-Lewis company.

Boorse Interested in Schreiber—Hugo C. Boorse, Milwaukee, Wis., has taken a large financial interest in the Schreiber Motor Car Company, state agent for the Locomobile, Haynes and Hudson. The name of the company has been changed to Schreiber-Boorse Motor Car Company.

Perrin Resigns from Regal—C. C. Perrin, who for the past 3 years has been assistant sales manager for the Regal Motor Car Company, Detroit, Mich., has resigned from that position to accept a position as sales manager with the American Motors Company, Indianapolis, Ind.

Buy Up Duplex Coil Company—F. C. Rueping and R. C. Wells, Fond du Lac, Wis., have purchased the interest of E. J. Huber and J. C. Fuhrmann, principal owners of the Duplex Coil Company, manufacturing coils, magnetos, ignition supplies and electric lighting systems for motor cars, and will continue the business with Mr. Wells as general manager.

Makes Record Time—H. W. Topping, 1093 Summit avenue, St. Paul, Minn., made an automobile trip last week from New York City in 5½ days plus 3 hours.

Sells Accessories in Batimore—Ferdinand C. Latrobe is now handling a general line of automobile accessories in the Oakland Motor Company building, Baltimore, Md.

McCool Wins Promotion—O. N. McCool, formerly sales manager of the Start-Lite Company, Chicago, has recently been made secretary and general manager of the company.

Gets Zilio Agency—The Baltimore, Md., agency for Zilio, the vegetable compound which is used in place of air in tire casings, is now in the hands of H. F. Parker & Company.

Making Over Its Building—The Auto Tire Sales Company, 151 West Sixth street, St. Paul, Minn., has begun to make over its building to get additional space. A. P. Jungck is manager.

Magee Flanders Comptroller—Charles A. Magee, formerly comptroller of the General Motors Company, has taken a position of similar nature with the Flanders Manufacturing Company, Pontiac, Mich.

Salina Now Motorized—The last horse in the Salina, Kan., fire department has been discarded for a KisselKar truck, which has been found much more efficient in responding to alarms than the horse-drawn type of apparatus.

Hawes Joins Everitt Forces—F. W. Hawes has been appointed production engineer for the Metzger Motor Car Company, Detroit, Mich. He was formerly in the engineering department of the Cadillac Motor Car Company.

More Bids Wanted—All of the bids received by the director of safety of Columbus, O., for the erecting of a municipal garage to house the police patrols were above the estimate and were rejected. The work will be re-advertised.

Young Goes to Regal—C. S. Young, engineer and designer for the Lozier Motor Car Company, Detroit, Mich., has severed that connection and has joined the forces of the Regal, with the title of assistant general manager to Fred Haines.

Redwood Falls Tour Begins—The second annual tour of the Redwood Falls Automobile Club began July 12 and will end July 15. The first night stop was at Austin, Minn., and the second and third nights at the Hotel Radisson, Minneapolis. There are about 100 of the tourists.

Builds a Racing Car—C. E. Ross, of the Ross Garage Company, of Columbus, O., has completed a 90-horsepower racer which he will enter in the Columbus 100-mile race August 25. The engine is one of Mr. Ross's own construction and he claims that the car will make 100 miles per hour.

Good Roads Club Formed—The Yakima County Good Roads Association, consisting of all the civic bodies in Yakima County, Washington, was formed recently. The purpose of the association is to work out plans for the location of the roads to be built with the proposed $1,000,000 bond issue.

Many to Tour to Detroit—Invitations to participate in the Cadillaqua parade and festivities have been accepted by automobile clubs in Cincinnati, Indianapolis, Dayton, Chicago, Milwaukee and Grand Rapids in addition to a large number of smaller cities in the state of Michigan. It is announced that all will tour to Detroit.

St. Louis Firms Combine—The Chicopee Motor Car Company, handling the Cutting and Stevens-Duryea in St. Louis, Mo., has consolidated with the Superior Motor Sales Company, holding the Stoddard-Dayton. The combined concern will be known as the Superior Motor Sales Company.

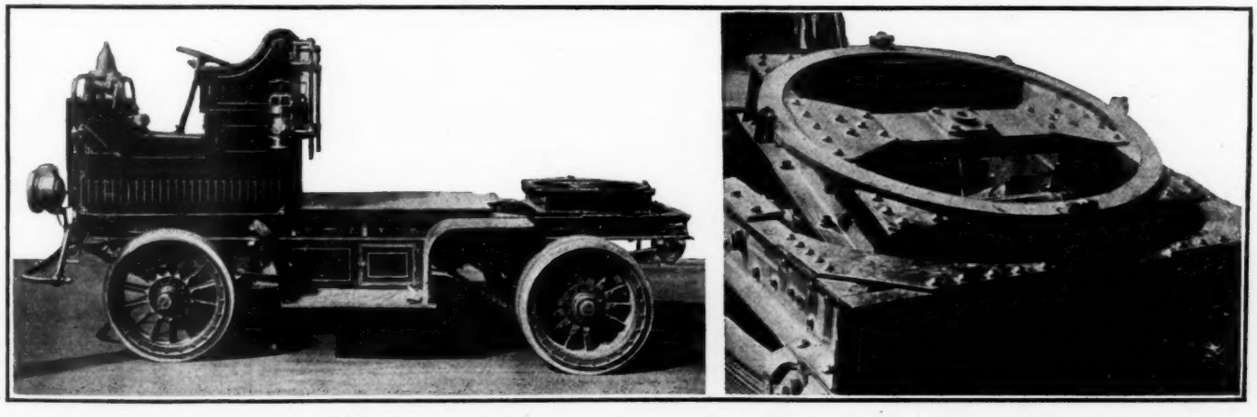
Now Hudson Agents—Walter J. Bemb, central district sales manager, and L. J. Robinson, southern district sales manager, for the Hudson Motor Car Company, have resigned from the Hudson company and have established the Bemb-Robinson Company as distributors for the Hudson line in the vicinity of Detroit, Mich.

Archey-Atkins to Move—The Archey-Atkins Company will move into a new salesroom at Capitol avenue and Michigan street, in Indianapolis, Ind. The Globe Realty Company has completed a three-story reinforced concrete building for the use of the company, which has the agency for the Hudson, Pierce-Arrow and Detroit Electric.

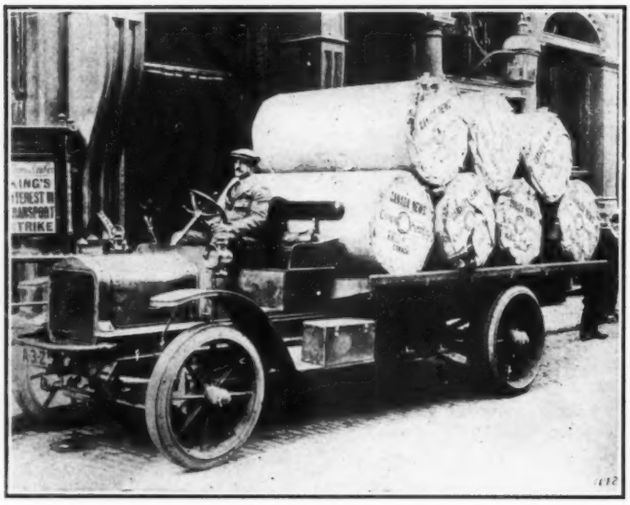
Big Regal Convention—Preparatory to the distribution of the coming season's output, there has been held at Detroit, Mich., a convention of the traveling representatives of the Regal Motor Car Company. Business sessions were held each day, but mixed in with the more serious parts of the program was enough pleasure to make the gathering one of the most enjoyable as well as one of the most profitable in the history of the Regal organization.

Peerless Men Honored—Academic recognition of the contributions made by the heat-treating department of the Peerless Motor Car Company, Cleveland, O., to the improvement of metals for use in motor cars was given by the Case Scientific School, of Cleveland, recently when it conferred the degree of Metallurgical Engineer upon Robert Abbott and Mark Ammond. Abbott is the chief metallurgist of the Peerless Motor Car Company and Ammond his assistant.

Alco Tractor for Schenectady—The American Locomotive Company has just furnished to the Schenectady fire department an Alco tractor designed to replace horses in drawing hook-and-ladder trucks to fires. Upon the tractor is mounted a fifth-wheel device to which the ladder truck is attached, the latter being guided independently of the tractor. The operation of the fifth wheel is not affected when the tractor drops into a depression of the road. The tractor has a 110-inch wheelbase, and its tire equipment consists of 36 by 5 single solids on front and 36 by 4 dual solids on the rear.



Alco tractor built for the Schenectady fire department, used to draw hook-and-ladder truck. Detail of fifth-wheel device



White truck used by London newspaper during strike

Henderson Offices Are Transferred—The Henderson Motor Car Company, Indianapolis, Ind., has removed its offices to its factory at North West and Fourteenth streets.

Motz Branch in Cleveland—The Motz Tire & Rubber Company, Akron, O., has established a direct factory branch in Cleveland, O. The branch is in charge of Charles Serfass.

Nelson Resigns from Diamond—F. O. Nelson has resigned as manager of the Diamond Rubber Company's Los Angeles, Cal., branch and will shortly enter business for himself.

Work Begun on Atlanta Building—Work was started recently on the new building for the Oakland Southern branch in Atlanta, Ga. The building will be located at the corner of Peachtree and Linden streets.

Crane Chicago Locomobile Man—George A. Crane, formerly with the Knox Automobile Company and United States Motor Company, has taken charge of the Locomobile business in the Chicago territory.

Garford Sells Patrol Wagon—The Garford Company, Elyria, O., has sold a patrol wagon to the city of Newark, N. J. The wagon is a 40-horsepower machine, has a capacity for twelve passengers and a maximum speed of about 45 miles an hour.

Tire Company's Branch Moves—The United States Tire Company's St. Louis, Mo., branch will move to the northeast corner of Compton avenue and Locust street about July 15. This is directly across from the new building of the Firestone Tire & Rubber Company.

Kemps Purchase Repair Station—Harry C. Kemp and Matt C. Kemp have bought from W. D. Rightmire the tire repair station at 1629 Hennepin avenue, Minneapolis, Minn., and will change the name from the Minneapolis Auto Tire Repair Station to the Minneapolis Tire Repair Company.

Republic Branch has New Quarters—The Northwestern branch of the Republic Tire Company, St. Paul, Minn., has moved to a new building at 167-169 West Sixth street. The showroom is 25 by 100 feet. It has a heated driveway for winter use. In the basement is 5,250 square feet of storage space.

Wheeler Now Manager—C. E. Wheeler, formerly connected with the Franklin branch in Boston, Mass., has been made manager of the R. C. H. Corporation branch in that city, filling the vacancy caused by the transfer to the Pacific Coast of William Jordan, who has been manager of the Hub branch for several months.

To Have Sociability Tour—The Mankato, Minn., Automobile Club will have a sociability tour July 16 to Faribault by way of Madison Lake, Elysian, Waterville and Morristown. The Faribault club will meet the tourists on the road and escort them to the picnic grounds. The Mankato club will then return by Owatonna, Wasseco and Janesville.

Minneapolis Club After Thieves—The Automobile Club of Minneapolis, Minn., has paid $500 in rewards to two city detectives for capture of automobile thieves, one of whom is in St. Louis to be brought back. The club paid a large sum toward expenses in the capture of four automobile bandits who have terrorized the city and vicinity for a year.

White Bear Grows Again—The White Bear Auto Company has absorbed the St. Paul, Minn., agency for the R-C-H cars, and will have sale of the cars in Ramsey, Dakota, Washington and Chisag counties. The salesroom will be in the new garage of the company at 161-163 West Sixth street, St. Paul, into which the company has just moved.

Truck as a Strikebreaker—During the recent teamsters' strike in England which tied up practically all the transportation in London, the *London Daily News* employed a White 3-ton truck to haul its supply of paper from the docks to the publishing office. Without the truck publication would have been suspended during the strike. The *News* is now a convert to motor draying.

New Electric Ambulance—Washington, D. C., has added another motor-driven vehicle to its fleet of municipal machines. It is a Detroit-Electric ambulance and is used by the emergency hospital. The machine is the gift of a Philadelphia woman who formerly resided in the national capital. The car is finished in battleship gray, with bird's-eye maple interior and red upholstery and has all the latest hospital equipment.

Automobile Incorporations

AUTOMOBILES AND PARTS

BOSTON, MASS.—Marion Motor Car Company; capital, $5,000; to deal in automobiles. Incorporators: Albert R. Atwater, Albert L. Dinnin, Russell W. Campbell, Archie W. Campbell.

BROOKLYN, N. Y.—Dunham Auto Company; capital, $15,000; to deal in automobiles. Incorporators: Louis Carmadella, Charles A. Apfel.

BUFFALO, N. Y.—L. G. Schoepflin Company; capital, $10,000; to engage in the automobile business. Incorporators: Louis G. Schoepflin, L. O. Schoepflin, Herbert G. Schoepflin.

CHICAGO, ILL.—Seek Auto Company; capital, $8,000; to engage in the automobile business. Incorporators: James H. Seek, Herbert W. Crane, Emmet W. Mick.

CORINTH, MISS.—Corinth Auto Company; capital, $10,000; to deal in automobiles. Incorporators: W. A. Stewart, W. A. Hinton, T. F. Hinston, H. N. Young.

CUERO, TEX.—R. C. Flick Auto Company; capital, $10,000; to do a general automobile business. Incorporators: R. C. Flick, R. F. Flick, N. M. Crain

INDIANAPOLIS, IND.—Ideal Motor Car Company; capital, $100,000; to manufacture automobiles. Incorporators: H. F. Campbell, H. C. Stutz, W. F. Glickert.

MARION, IND.—Railway Motor Car Company; capital, $200,000; to make automobiles for use on railways. Incorporators: G. R. Stewart, J. D. Worth, Eben H. Wolcott, Hiram Beshore, W. G. Worth.

RYE, N. Y.—Jacob Werner, Inc.; capital, $1,000; to deal in automobiles. Incorporators: Jacob Werner, Ellen J. Werner, George J. Werner.

SAN ANTONIO, TEX.—Ford Sales Company; capital, $5,000; to deal in automobiles. Incorporators: M. D. George, Clifton George, G. H. King.

GARAGES AND ACCESSORIES

BUFFALO, N. Y.—Stewart Motor Corporation; capital, $250,000; to manufacture light capacity trucks. Incorporators: T. R. Lippard, R. G. Stewart, R. P. Lentz.

CLARKSDALE, MISS.—Essenkay Sales Company; capital, $4,000; to deal in punctureless tires and fill inner tubes. Incorporators: J. L. Hartshorn, J. W. Primrose, I. L. Ledbetter.

DETROIT, MICH.—Capital Auto Lock Company; capital, $10,000; to manufacture automobile locks. Incorporators: Benjamin Noble, Arthur E. Schreiter, Walter W. Martin.

DETROIT, MICH.—Parker Avenue Garage Company; capital, $10,000; to conduct a garage and repair shop. Incorporators: F. P. Schneider, Joseph E. Weisenberger, Walter M. Trayor.

DOTHAN, ALA.—Alabama Airless Tire Company; capital, $6,000; to make punctureless tires.

ELMIRA, N. Y.—International Resilio Company; capital, $50,000; to make and sell a preparation to take the place of air in tires. Incorporators: Raymond Nichols, Daniel L. Tharp, Samuel L. Welch, Henry Collin, Philip E. Lenergan.

FAR ROCKAWAY, N. Y.—Far Rockaway Garage; capital, $1,000; to conduct a garage and repair business. Incorporators: John A. Kilgallon, Michael J. Walsh, John J. Walsh.

Club to Post Road—The Automobile Club of Southern California is making preparations to post the road from Los Angeles to Mt. Wilson.

Clement Leaves Spokane—G. B. Clement has resigned as manager of the Spokane branch of the Goodyear Tire & Rubber Company, and will go to San Francisco to engage in the automobile business.

Essenkay in Maryland—The Essenkay tire filler is now being handled in Maryland and the District of Columbia by the Essenkay Sales Company of Maryland, Baltimore, Md. Clarence H. Clark is manager.

Installed in New Quarters—The Missouri Motor Car Company has moved into its new building at 3005-07 Locust street, St. Louis, Mo. The concern handles the Amplex, Alco, Abbott-Detroit and Marmon.

Hadley with Lenox—W. K. Hadley, until recently with the Marion Motor Car Company at Indianapolis, Ind., is now general sales manager and purchasing agent for the Lenox Motor Car Company, Boston, Mass.

Automobile Line Started—A motor car service has been installed between Gueydan and Florence, La. A seven-passenger car is being operated on a regular schedule and initial business is said to be encouraging.

Boston Firm Dissolves—White, Ware & Leatherbee, Boston, Mass., for some time New England representatives for Louis J. Bergdoll Motor Company, Philadelphia, Pa., have discontinued their agency and the firm will be dissolved.

Williams Made Advertising Manager—D. B. Williams, who has occupied the position of assistant sales and advertising manager of the American Motors Company, Indianapolis, Ind., has been appointed advertising and publicity manager.

Death of W. M. Jenkins—Williard M. Jenkins, one of the best known of the Boston motor dealers, and agent for the Abbott-Detroit and K-R-I-T cars in Boston and vicinity, died recently at his home at Exeter, N. H., after a brief illness.

A. N. Mayo Dead—A. N. Mayo, Springfield, Mass., one of the heaviest stockholders in the Fisk Rubber Company, died recently at his home. Besides the interests held in the Fisk company, Mr. Mayo also owned stock in the Knox Automobile Company.

After Good Roads in Montana—Secretary P. N. Barnard, of the Kalispell, Mont., Chamber of Commerce, suggests bonding the state for $10,000,000 to build a uniform system of highways in Montana. Resolutions will be submitted to every similar association for presentation to the Legislature for action.

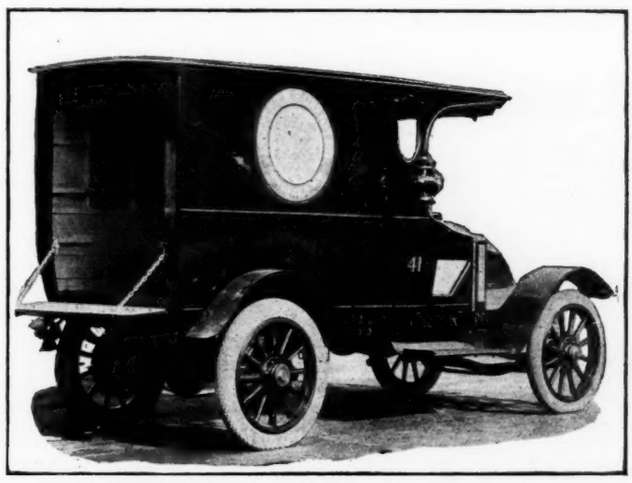
Combine Against Gasoline Rates—In order to be able to purchase gasoline and oil at better rates than could be obtained from local retailers automobile owners in Texarkana, Ark., have formed a co-operative society. It is claimed that arrangements have been made whereby several cents per gallon will be saved on gasoline.

No Meeting at Atlanta—The Atlanta Automobile and Accessory Association, Atlanta, Ga., has decided to give up its attempt to hold a meeting this summer on the Atlanta Speedway. A canvass of the situation demonstrated that a good entry list could be secured but the scheme was deemed impracticable when the cost of putting the track surface in condition was learned.

Hood Goes to Boston—Wallace C. Hood, formerly sales manager of the Everitt Motor Car Company, has gone to Boston, Mass., to join the firm of J. S. Harrington & Company, New England agents for the Everitt. He will have general charge of sales and distribution from the Boston, Worcester and Providence salesrooms making his headquarters in Boston.

Philadelphia Peerless Branch—A new factory branch of the Peerless Motor Car Company will soon be opened at 245 North Broad street, Philadelphia. R. W. Cook, formerly sales manager of the Philadelphia Peerless agency, will be in charge of the branch. Pending completion of the building the offices of the Peerless company are in the Abbott building, Broad and Race streets.

Special Ice Cream Trucks—The Lippard-Stewart Motor Car Company, Buffalo, N. Y., has built five panel body delivery cars, of 1,500 pounds capacity each, for the Hoefler Ice Cream Company, of Buffalo. The floor of the bodies is lined inside with zinc to prevent salt water from leaking down on the mechanism. Over this zinc is a removable oak grating on which the freezers are set.



Lippard-Stewart delivery car designed for ice cream business

Automobile Incorporations

JERSEY CITY, N. J.—Republic Auto Tire Vulcanizing Company; capital, $25,000; to manufacture and deal in automobile accessories. Incorporators: W. Merkel, N. J. Stinard, M. Levine.

MILWAUKEE, WIS.—Fisk Rubber Company; capital, $50,000; to deal in tire and rubber goods. Incorporators: Frank Lee and others.

MILWAUKEE, WIS.—Layton Park Oil & Soap Company; capital, $50,000; to manufacture and deal in motor oils and greases. Incorporators: Leo Hofmeister, W. O. Meilahn, E. A. Baker.

NASHVILLE, TENN.—Seaton Wheel Company; capital, $130,000; to manufacture automobile wheels. Incorporators: Cranberry Jackson, Samuel S. Lord, B. C. Seaton.

NEW YORK CITY—American Motor Freight Company; capital, $25,000; to transport freight by means of automobiles. Incorporators: H. G. Waring, H. W. Bell, H. G. Phillips.

NEW YORK CITY—Canadian Overman Company, Inc.; capital, $50,000; to manufacture and deal in tires. Incorporators: Albert Z. Gary, Lucius Wilmerding.

NEW YORK CITY—East End Garage, Inc.; capital, $1,000; to conduct a garage business. Incorporators: Henry Krauss, Pauline Krauss, Max Steindler.

NEW YORK CITY—Russian Tire Sales Company; capital, $30,000; to deal in pneumatic tires. Incorporators: Otto Braunworth, H. Ray Paige, Maud Steinway Paige.

NEW YORK CITY—Standard Auto Coach Burial Company; capital, $200,000; to conduct an automobile funeral business. Incorporators: J. Newberger, Frank C. Cochren, S. S. Lowenstein, Wayne Litzinberger, C. H. Tebbetts.

SPARTANSBURG, S. C.—Little Automobile Supply Company; capital, $10,000; to deal in automobile accessories and supplies. Incorporators: S. C. Littlem, T. S. Sease, D. D. Little.

SYRACUSE, N. Y.—Jefferson Garage Company; capital, $30,000; to conduct garage and repair shop business. Incorporators: Antonia Matzene, Charles J. Roehm, Charles J. Baumer.

TOLEDO, O.—Rapp Manufacturing Company; capital, $15,000; to make spark plugs and other accessories. Incorporators: Samuel W. Rapp, Clifford D. Stone, Samuel L. Thorburn, Otto L. Hankinson, Chester D. Few.

TORONTO, ONT.—Automobile Owners' Association; capital, $100,000; to manufacture machinery for the making of automobiles. Incorporators: Arthur W. Holmstead, William L. Carr, W. B. McKenzie.

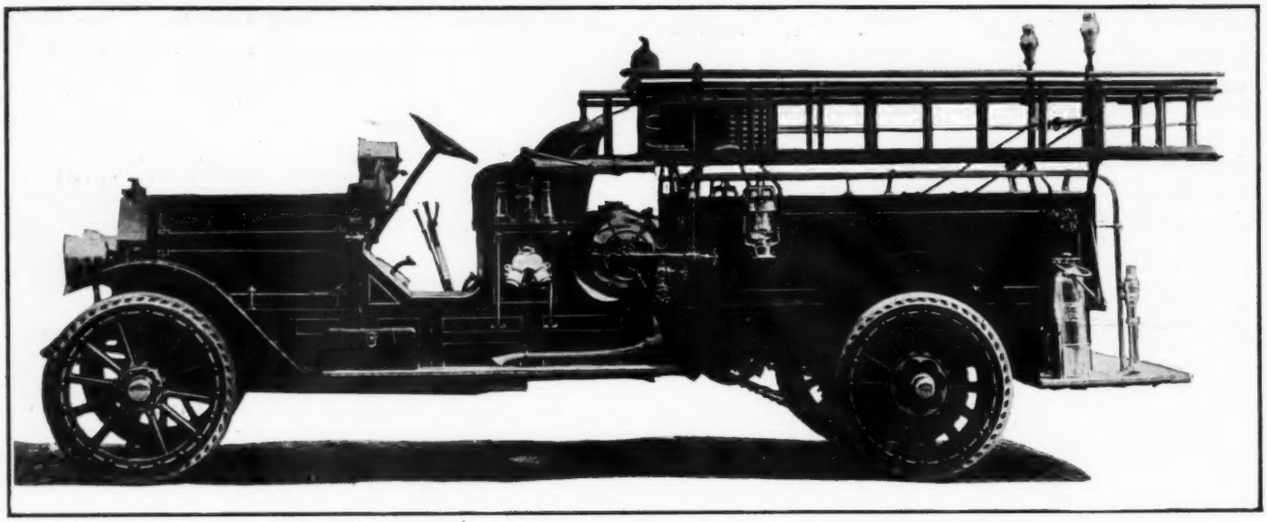
TORONTO, ONT.—Toronto Rubber Company; capital, $100,000; to deal in rubber products, including tires. Incorporators: Thomas Price, Carl H. Smith, Walker B. Stratton, E. E. Erskine, Louise O'Neal.

WEST FALLS, N. Y.—Golden & Buffalo Auto Service Company; capital $2,000; to conduct a passenger service in Erie County. Incorporators: Fred Hey, S. Hey.

CHANGES OF CAPITAL

CINCINNATI, O.—Hanauer Automobile Company; capital increased from $20,000 to $50,000.

TOLEDO, O.—Toledo Motor Truck Company; capital increased from $95,000 to $150,000.



New KisselKar 2-ton chemical truck in the service of the Salina, Kan., fire department

News of the Garages

Grayling Has a New Garage—Grayling, Mich., has now a first-class garage operated by the Grayling Machine Repair Company.

New Garage in West Rutland—Richard Mead and Arthur Walker are erecting a garage and repair shop on Clarendon avenue, West Rutland, Vt.

Onley Garage Is Opened—Lee B. Kellam and his nephew, J. T. Kellam, have opened an up-to-date garage in Onley, Va., under the name of the Onley Garage Company.

Another Garage for Fitchburg—F. B. Higgins has opened a public garage on Water street, Fitchburg, Mass., where he will do a general accessory business as well as garage work.

Bluefield Garage to Build Soon—John L. Crockett, Bluefield, W. Va., has awarded a contract for a concrete-steel garage to P. A. Dunn. The garage will cover an area 50 by 130 feet.

New Automobile Agencies

PLEASURE CARS

Place	Car	Agent
Ada, O.	King	J. H. Jones.
Atlanta, Ga.	Alco	M. Neighbors & R. M. Northcutt.
Atlanta, Ga.	Cole	M. Neighbors & R. M. Northcutt.
Baltimore, Md.	Detroiter	Detroiter Baltimore Co.
Atlanta, Ga.	Packard	Jack O'Dell.
Binghamton, N. Y.	Alco	H. T. Rogers.
Calgary, Alta.	Alco	Geddes & Sheffield.
Edmunton, Alta.	Alco	Taylor & Musson.
Memphis, Tenn.	Alco	Six Thirty-Eight Tire & Vulcanizing Company.
Milwaukee, Wis.	Detroiter	R. A. Creek.
Milwaukee, Wis.	Oakland	R. A. Creek.
Milwaukee, Wis.	Stutz	George W. Browne.
New Haven, Conn.	Thomas	Knight Garage, Inc.
Owens, Ohio	King	J. D. Owens.
Peekskill, N. Y.	Alco	W. H. Ash.
Rochelle, Ill.	Alco	Geo. E. Stocking.
Seattle, Wash.	American	George E. Johnson.
Seattle, Wash.	Hudson	C. L. Ross.
Seattle, Wash.	Marion	George E. Johnson.
Seattle, Wash.	Painge Detroit	George E. Johnson.
Spokane, Wash.	Lozier	Metropolitan Motor Car Company.
Winnipeg, Man.	Chalmers	Joseph Maw & Co., Ltd.
York, Pa.	R-C-H	York Garage & Supply Co.

ELECTRIC CARS

Portland, Ore.	Ohio	Braly-Dubois Auto Co.

COMMERCIAL VEHICLES

Atlanta, Ga.	Federal	M. Neighbors & R. M. Northcutt.
Kansas City, Mo.	Lincoln	Indiana Garage & Sales Co.

Macon's Two-Story Garage—The Harrold Banking & Savings Company, of Macon, Ga., has awarded a contract for the erection of a garage on First street. The building will be two stories high.

Perkins & Corliss Build—A large brick garage is being erected on Western avenue, Gloucester, Mass., for the Perkins & Corliss Company, giving the firm much larger room than it now possesses.

Rothfuss Garage Being Enlarged—The Rothfuss Garage, of Williamsport, Pa., is to be expanded so as to have a capacity for forty automobiles. The addition to the building will be of brick and concrete.

Goltra Opens in Greenwich—Newton R. Goltra has opened a garage on Railroad avenue, Greenwich, Conn., under the name of the Depot Garage & Machine Works, in which a general garage will be carried on.

Council Bluffs' Growing Motordom—The continued progress of the automobile in Council Bluffs, Ia., is illustrated by the fact that Barney Gilinsky is constructing a garage on corner Broadway and Eighth street.

Cohen Buys in New Britain—The garage on Arch street, New Britain, Conn., conducted by H. B. Freeman, of Hartford, has been sold to Aaron Cohen. The purchase includes the Ford agency formerly conducted by Freeman.

To Store Cars in Gardiner—M. M. Spear and W. L. Tozier have taken the lease of the garage building on the causeway opposite the depot at Gardiner, Me., and have opened a general accessory business and storage service there.

Loos' Garage Has No Posts—Loos & Son, Coshocton, O., have moved into their new garage, which is of cantilever construction, so that cars may be driven through the garage without meeting an obstruction.

Fillow Company Expands—The Fillow Auto Company, Danbury, Conn., has purchased two lots immediately east of its garage on Crosby street, and the land will be leveled immediately and used for day storage temporarily. Later on a new structure devoted to the motor truck business will be erected on the property and joined to the company's present structure.

Minneapolis Has Electric Garage—Fred H. Day and Harry I. Murphy have opened an electric garage in Minneapolis, Minn., the establishment being named the Owl. It is a two-story building and covers a space of 70 by 70 feet; the capacity of the garage is for 150 cars. The new electric garage building by the Kemp Brothers Automobile Company will be completed in July.

Factory Miscellany

BIG Chalmers Addition—The Chalmers Motor Company, Detroit, Mich., has approved the first general plans and will start work at once on an extensive addition to the present plant. The immediate operations will consist of the erection of one four-story building which will form a connecting link between the present assembling building and machinery building, both of which are four stories, 60 by 400 feet. This structure will be 191 feet long by 71 feet wide and four stories in height, adding 55,000 square feet of floor space to the present manufacturing facilities of the Chalmers Motor Company. Construction arrangements will also be made for an additional building to be joined to the new structure and to be an exact duplicate of the three main buildings of the factory, which are 60 feet wide by 400 feet long and four stories in height. The new structure will be an all-concrete and steel building. There will be no beams or girders showing anywhere in the interior of the building. The estimated cost of this building is approximately $75,000. Equipped as now contemplated the total cost of the structure will be between $150,000 and $200,000.

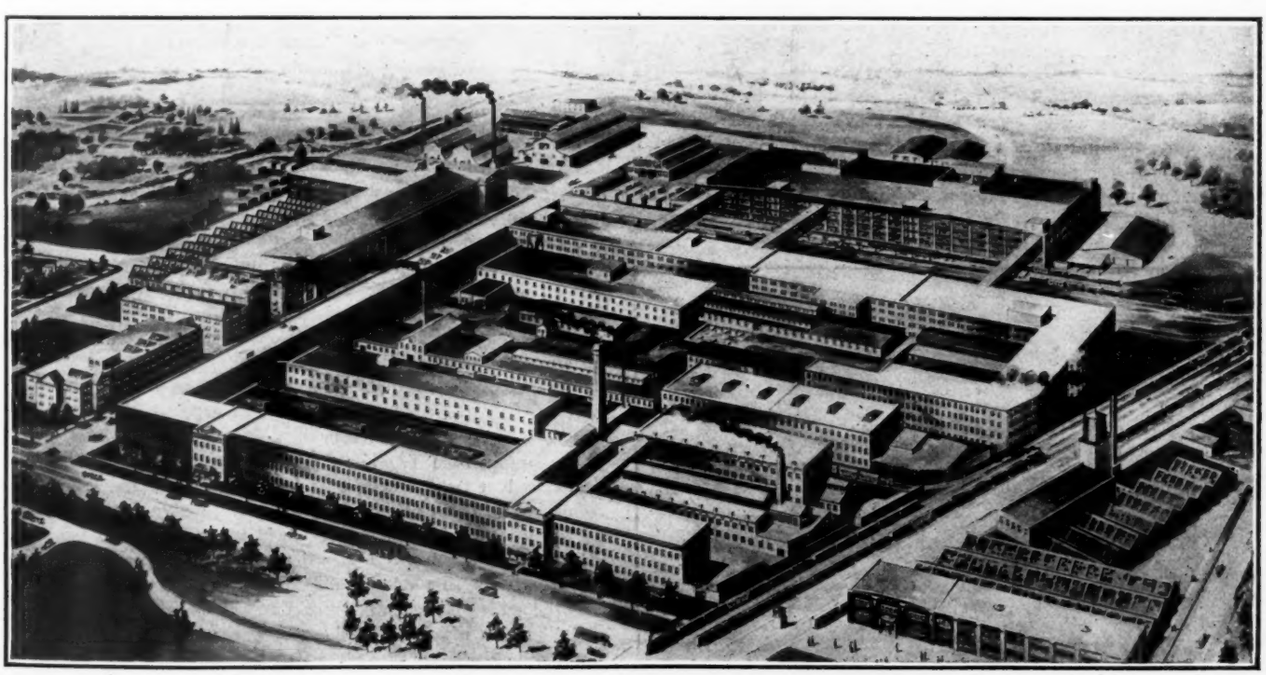
Ford Buys Real Estate—The Ford Company has completed the purchase of a trackage site in Minneapolis, Minn., which will be used for the erection of an assembling and distributing plant for the Northwestern service of the company. The cost of the site is $51,000. Operations will start at once.

Nyberg Works to Make Trucks—The Nyberg Automobile Works, Anderson, Ind., is to manufacture trucks on a large scale. The Nyberg truck will have a 3,000-pound capacity and sell for $2,000. One of these trucks, loaded to its full capacity, will be in the Indiana Four States Tour. This will be one of the most severe tests to which a gasoline truck has ever been subjected, for the route through Ohio, West Virginia, Kentucky and Indiana will present obstacles which only the best of trucks can overcome.

Kissel Increases Capacity—The Kissel Motor Car Company, Hartford, Wis., began work on July 1 on the construction of a new body building shop to be 100 by 100 feet in size, two and one-half stories high, of fireproof construction. The new building will nearly double the Kissel company's body-building facilities, and is made necessary by the 40 per cent. increase in the 1913 production as compared with 1912.

Hess-Bright Company Moves—The Hess-Bright Manufacturing Company has transferred its office to its new factory at Front street and Erie avenue, Philadelphia. Removal of the manufacturing department of the business will be performed progressively during the month of July. The old quarters at Twenty-first street and Fairmount avenue have for the past two years been inadequate for the rapidly growing business of the company, and the new site, which covers some 13 acres, affords ample room for much needed expansion.

Hartford Rubber Works Expanding—As soon as inventory is closed at the factory of the Hartford Rubber Works Company, Hartford, Conn., extensive alterations will take place at that plant. The boiler plant capacity will be increased by the addition of a new building, 50 by 100 feet, which will be built of reinforced concrete. This will enable the company to enlarge its engine power to 3,000 horsepower. Among the improvements planned is an automatic coal-feeding mechanism, a 200-foot smoke stack and numerous improvements of the plumbing. A turbine, driving an 800-kilowatt generator, will also be installed.



Plant of the Willys-Overland Company at Toledo, O., where the Overland cars are made

Manifold-Injector Starter; Vacuum Core Tire; New Model of Gasoline Meter; Coes Special Wrench for Automobile Use; High-Grade Rubber Casings and Tubes

The Blitzen Acetylene Starter

AMONG the many acetylene starters which have been offered to the automobile public of late, the Blitzen starter, Figs. 1 and 2, is especially deserving of mention because of its simplicity. The starter consists of a needle valve interposed in the acetylene lead between tank and intake manifold, this valve mechanism being combined with an electric cut-out. In the cut-away view, Fig. 1, N is the needle, which is made of tool steel and seats on soft metal S1. The needle-valve stem which is screw-threaded to engage the spindle S is actuated by the handle H, and, when the needle is opened by turning the handle as far as possible in a clockwise direction, the handle touches the piece C1. This piece has an extension T which is connected to the low-tension terminal on the magneto, so that when acetylene is admitted to the manifold, the contact of the handle and the piece C1 cuts out the ignition system by short-circuiting the magneto and admits a charge of acetylene to the motor. The acetylene enters through L1 and leaves through L2, and the needle is brought back to its seat by the action of a coiled spring inside the casing C; at the same time the contact of H and C1 is interrupted. The charge of acetylene in the motor keeps the same ready for starting, so that by throwing the switch on the battery the motor is started, after which the switch is kicked over on the magneto. If the motor has been standing for some time, especially with the compression release cocks open, the first thing to do is to close these, give the crank a quarter-turn with the ignition cut out, then switch on the battery and thereby start the motor.

A Thermos Lunch Restaurant

Under the name Thermos Motor Restaurant, the American Thermos Bottle Company 243 West Seventeenth street, New York City, manufactures a touring lunch outfit containing two Thermos bottles, plates, knives and forks for either four or six persons, napkins, salt and pepper shakers and wicker-covered glasses. This equipment is inclosed in a black patent-leather waterproof casing.

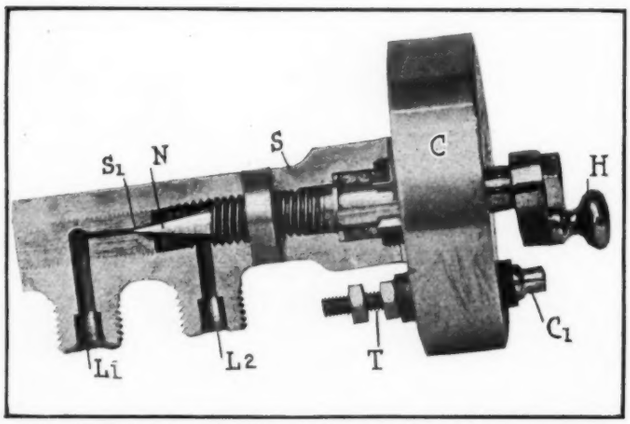


Fig. 1—Distributer of Blitzen starter with one half cut away

Woodcock Vacuum Tire

Substituting an evacuated space for the air of inner tubes, W. J. Woodcock, 102 Gates avenue, Brooklyn, N. Y., has constructed a vacuum tire for automobiles which consists of a rubber core bored with an annular vacuum chamber, the cross-section of which is in the shape of a figure eight. A fabric layer of substantial thickness is arranged around the rubber core, and a rubber tread is laid over the tread portion of the fabric. The vacuum space is also surrounded by a layer of fabric. To put the tire in running condition it is deflated by a pump, the influx of atmospheric air being prevented by a check valve. With the load of the car acting on the tires, the tendency is to compress the shape of the vacuum chamber. This tendency is counteracted by the exterior atmospheric pressure, resulting in a very elastic tire, according to its inventor and manufacturer. The partial vacuum in the tire tends to keep it cool.

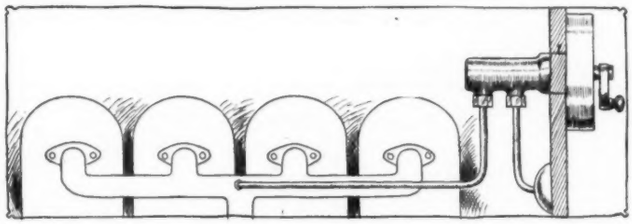


Fig. 2—Scheme of Blitzen self-starter on a motor, showing the manner of leading gas to the intake manifold

Latest Smith Gasoline Meter

The Smith Gasoline Meter, 1789 Broadway, New York City, has redesigned its product, which is shown in Fig. 5. In the newer model, the indicator part of the meter is a brass cylinder over which slides a tape on which is printed the maximum number of gallons of gasoline contained by the tank, while the older model has an indicator finger moving over a circular dial printed in gallons. The construction of the meter is clearly illustrated in Fig. 5. It consists of a float F carried by the gasoline in the tank and held in the same vertical plane, at all times, by a brass rod R and a brass pipe P. A linen cord attached to the float is led through the pipes P, P1 and P 2 and its end is connected to that of the linen indicator tape which is held tight by the weight of a square brass column, 2 inches long, sliding in the square tube T. The float is made of 18-gauge brass and perforated at two places in its top and bottom, the holes being connected by short pipes soldered thereto, making the entire float perfectly tight. The float is made in two sections, an upper and a lower one, which are soldered together. The height of P and R varies with that of the gasoline tank and is so dimensioned that the pulley-containing connection comes within the space of the filler cap which holds the top of the rod and pipe in position while their lower ends are held in place by the plate P3 resting on the bottom of the tank. Tightness around the passage

of the pipe P is insured by a lead packing placed between the tank bottom and the nut N screwed up against it.

The connection between the cord and tape is obtained by the use of the piece C1, which is of brass and bored with an axial passageway opening into one worked toward the opposite and along part of the length of the piece. A knot made in the cord is slipped through the second-mentioned passage, while the tape is drawn through the axial passage and a knot is used to keep it in place. The mechanism M, which consists of the brass cylinder and two spindles over which the tape slides, being kept in alignment, is simple and strong, and made of very few parts. This mechanism is inclosed in the indicator casing C2, the front of which is of beveled glass marked with a black line to give exact readings on the tape. The installation of the gasoline meter on the car and the correct marking of the tape are simple operations, and once installed, the device need never be worked with again as it is practically foolproof.

Special Automobile Wrench

In Fig. 3 is shown the special automobile wrench made by the Coes Wrench Company, Worcester, Mass. The tool is of the ordinary monkey-wrench design and works on the same principle of worm and nut engagement. The strength of the material and the proper shaping of its portions make it especially suitable for automobile use. One of the distinguishing features of this wrench is the strong, heavy, movable jaw. The gripping faces of the jars are plain, and a tight hold on the object may be obtained by this tool although there is no locking provision made in its construction.

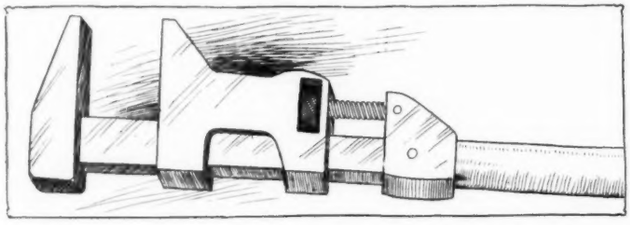


Fig. 3—Coes special automobile wrench, showing simple and substantial lines and very strong grip jaws

Fig. 4—Cross-section of Portage casing for light motor trucks

Portage Casings and Tubes

The Portage Rubber Company, Akron, Ohio, is the manufacturer of the casing which is shown in section in Fig. 4. The casing illustrated is designed for use on 1-ton trucks for fire-department work and similar purposes. The tread R_1 is built up on a cotton fabric of seven layers thoroughly frictioned together and strengthened at the tread side by a double reinforcement layer R. A single breaker strip B affords additional strength at the bead, where a cushion C of live rubber is enclosed in the vulcanized Para forming the tread material. The tubes manufactured by the company are of one of the best grades of up-river Para gum.

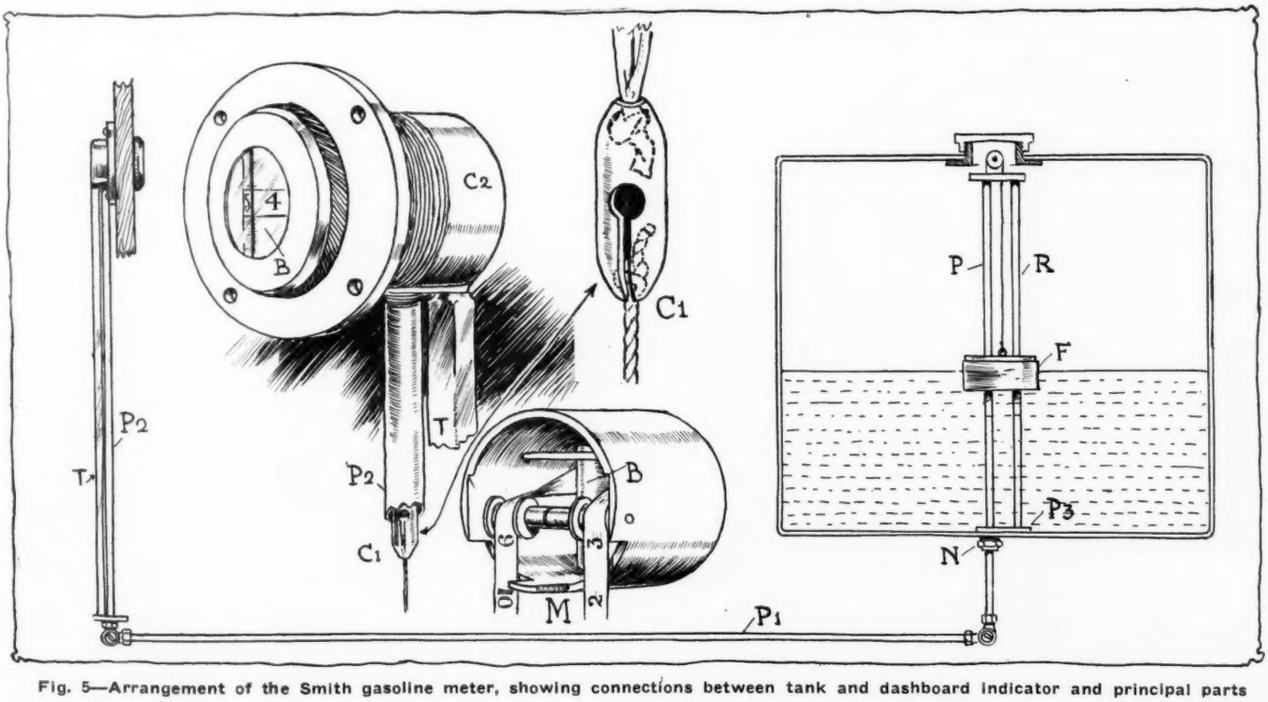


Fig. 5—Arrangement of the Smith gasoline meter, showing connections between tank and dashboard indicator and principal parts

Patents Gone to Issue

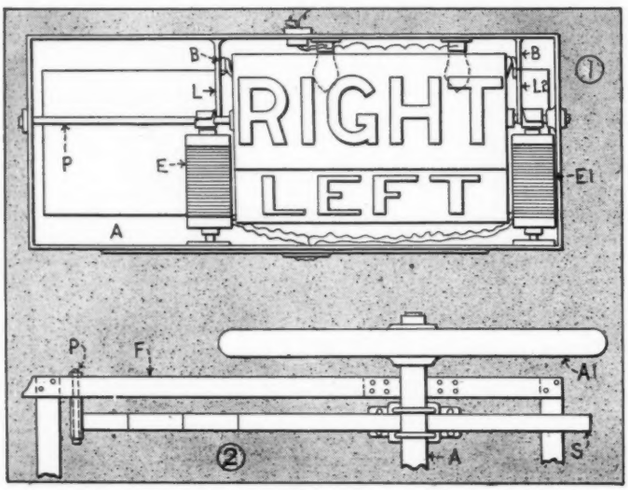


Fig. 1—Tail-light signal to be operated from the driver's seat
Fig. 2—Trott special circular vehicle spring suspension

VEHICLE Signal—A tail light indicator signal which is electromagnetically operated from the driver's seat.

This patent refers to an automobile rear signal, Fig. 1, consisting of a casing which contains electric lights L and a clear glass pane P in its rear wall. A rod R traverses the front of the casing, and two spaced brackets B are pivoted on the rod R, carrying a convex transparent sign arranged to be swung into a position behind the pane P. Another pair of brackets is pivoted on the rod between the other two; these brackets carry another sign which may also be swung in the same way. One of the signs bears the word Right, the other the word Left. At each of the signs an electromagnet E, E1 is arranged in the casing, each having an armature which is pivoted on the rod, lying over the respective magnet and has its rear end linked to a lever L, L1 fulcrumed above the armature. A link connection is provided between the forward ends of the two levers and one pair of brackets near their pivots. Electric circuits which are controlled by the driver excite the magnets and thereby regulate the relative positions of the signs.

No. 1,028,854—to Edward J. Best and Charles M. Fitch, Chicago, Ill. Granted June 11, 1912; filed December 27, 1910.

Vehicle Spring—A suspension type consisting of a circular spring fixed to a pivot and restrained in its movements by an alignment spring.

Fig. 2 shows the subject matter of this patent. A vehicle frame F is used in combination with a wheel axle A, a spring S being interposed between them and being pivotally connected at P with the frame. This spring is adapted to move circularly about its pivotal support. A non-supporting alignment spring is connected with the frame so that it resiliently opposes the circular movement of the first-mentioned spring.

No. 1,029,730—to Rolland S. Trott, Denver, Colo. Granted June 18, 1912; filed July 19, 1909.

Shock-Absorber—Comprising two sets of springs above and below the axle, which tend to hold the latter in position.

This type of shock-absorber, Fig. 3, requires the design of an axle with two forks F at its ends. To the ends of each fork a pair of horizontal cross-bars C is secured. An inverted U-shaped member A straddles each wheel, and the inner legs of these members extend through the above mentioned cross-bars to which they are rigidly connected. In the same plane as the cross-bar C of each fork end an upper and a lower cross-bar is arranged; the latter cross-bars being perforated to receive the outer legs of the member to which they are rigidly attached. On the inner leg of each member a sliding cross-head H is mounted, and another H1 on the outer leg of each arm. Springs are mounted on each leg of each member, being disposed between the opposite faces of the cross-heads and the cross-bars. A spindle for carrying the wheel has its ends secured to the cross-heads H and H1.

No. 1,031,381—to Herman H. Schmitt, Creswell, Ore. Granted July 2, 1912; filed March 4, 1912.

Windshield—Which is of the flexible type and may be moved to various positions.

This patent refers to a windshield, Fig. 4, which is so arranged that it may be made to slide on a curved rail disposed in the longitudinal plane of the automobile. The windshield is supported on the rail by means of an adjustable mechanism, and a slidable connection between shield and rail permits of clamping the windshield in position at desired points.

No. 1,031,020—to George F. Murphy, New Haven, Conn. Granted July 2, 1912; filed January 18, 1911.

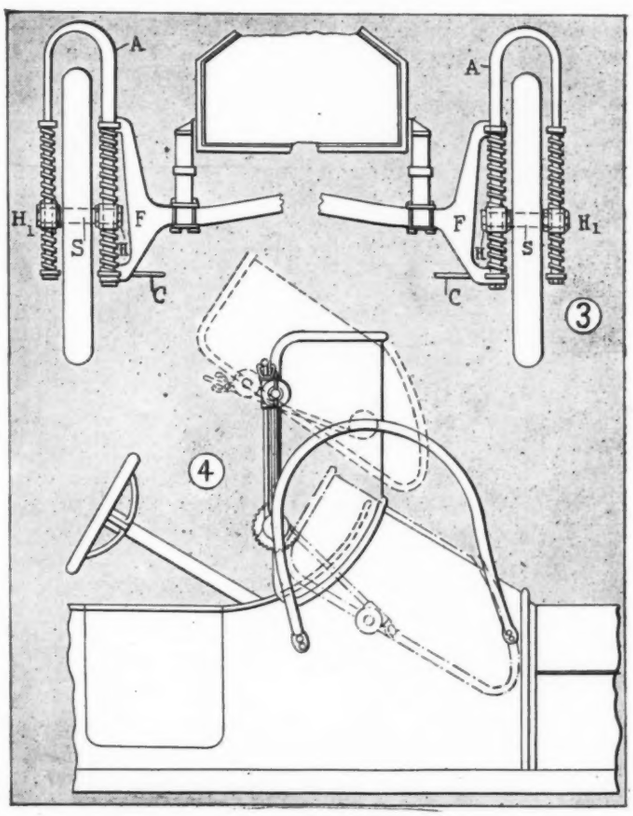


Fig. 3—Schmitt type of spring action shock-absorber
Fig. 4—Murphy adjustable automobile windshield